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CAREFUL PLANNING FOR THE ELEMENTARY SCHOOL MAXIMIZES THE USE OF SPACE TO PROVIDE CHILDREN WITH FREQUENT CHANGES IN ACTIVITY AND A WIDE VARIETY OF EXPERIENCES. IN THE PLANNING PROCESS, SPECIAL CONSIDERATION IS GIVEN TO LONG RANGE DEVELOPMENT THUS PREVENTING OVERBUILDING AND UNDERBUILDING. THE PLANT SHOULD FIT, THROUGH INCREASING UTILITY BY FLEXIBILITY OF DESIGN, BOTH THE PRESENT AND FUTURE NEEDS OF THE EDUCATIONAL PROGRAM. THESE GENERAL FACTORS ARE CONTROLLED BY A JUDICIOUS ASSESSMENT OF THE FOLLOWING--(1) A FORECAST OF DISTRICT-WIDE SCHOOL POPULATION, (2) APPRAISAL OF EXISTING SCHOOL PLANTS, (3) FORMULATION OF A MASTER LONG-RANGE PROGRAM, (4) FORMULATION OF EDUCATIONAL SPECIFICATIONS, (5) SELECTION OF AN ARCHITECT, (6) SELECTION OF A SITE, (7) DEVELOPMENT OF PRELIMINARY PLANS, (8) APPROVAL OF FINAL PLANS AND SPECIFICATIONS, AND WHERE APPLICABLE, (9) COORDINATION OF THE PLAN WITH THE STATE DEPARTMENT OF PUBLIC INSTRUCTION. COMPLEMENTING THE GENERAL PLAN ARE SUCH SPECIFIC FACTORS AS CLASSROOMS, SAFETY, OPERATION AND MAINTENANCE, STORAGE FACILITIES FOR BOTH INSTRUCTIONAL AND NON-INSTRUCTIONAL MATERIALS PER CAPITA, SANITARY AND PLUMBING FACILITIES, SPECIAL AREAS--MUSIC ROOMS, AND AUDITORIUM, FOOD SERVICE, OFFICE SPACE AND OTHER AREAS NEEDED TO CARRY OUT THE SCHOOL PROGRAM. (GM)

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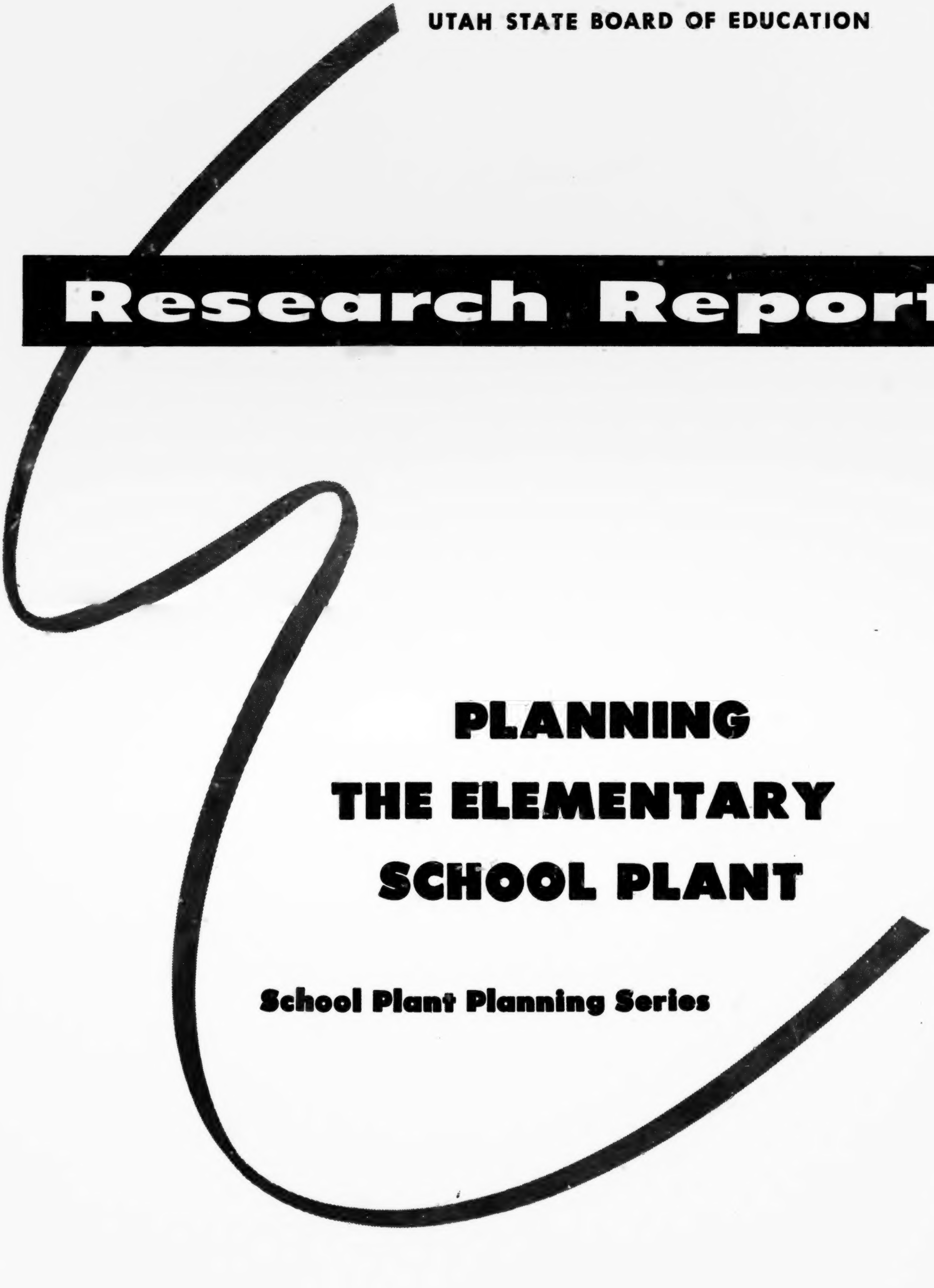
Research Report



PLANNING THE ELEMENTARY SCHOOL PLANT

School Plant Planning Series

EF 000040

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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SCHOOL PLANT PLANNING SERIES

PLANNING THE ELEMENTARY SCHOOL PLANT

UTAH STATE BOARD OF EDUCATION

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Chapter I

THE ELEMENTARY SCHOOL - PHILOSOPHY AND PROGRAM

A. Introduction

It is intended in this chapter to set forth briefly the philosophy and program of modern elementary education. Physical facilities which serve well and provide the efficient implements and good environment for the ever-changing educational program can come about only when careful planning is based upon a sensitive awareness of the philosophy and nature of the educational program.

The importance of this concept is such that it should not be taken for granted. Hence, it is felt that this chapter is an important part of the planning guide. To be sure, this chapter alone is not enough to give the desired understanding of the philosophy and nature of elementary education. All members of the planning team -- those whose task it is to prepare the educational requirements into plans and specifications for construction -- must refer to and study other sources such as those referred to in the appended bibliography.

B. Definition of Terms

The term, "elementary school," as used herein, means a school for children in grades kindergarten through six. This corresponds with the general pattern of school organization in Utah. Variations are relatively few and may or may not contain conditions calling for special consideration in planning the physical facilities. Two examples of variations with implications for modifications of school plant may be named. The indoor facilities for play and physical education may need to be expanded somewhat in schools containing the seventh and eighth grades.

In schools housing both elementary and secondary programs special attention should be paid to providing needed isolation of elementary age groups.

The terms "school plant" and "physical facilities" are used interchangeably to refer collectively to the school site, buildings, and building content (furniture and equipment) making up the school center.

C. Philosophy and Program

In a good elementary school each child is accepted and treated as a worthy individual. Each boy and girl is recognized as a physically, socially, emotionally, and intellectually growing organism. Each of these various areas of growth and development -- physical, social, emotional, and intellectual -- has its own peculiar pattern, but all are interrelated.

In selecting, planning, and organizing the experiences for children, and in determining the procedures to be followed, consideration is given to individual characteristics of growth and development and to differences in maturity levels possessed by children. It is recognized that children need opportunity for frequent change in activity through the day, and that the program should include a wide range of experiences.

The growing application of the foregoing philosophy has brought about many changes in the elementary school program which are increasingly reflected in the school plant. Classrooms designed for the needs of children in the characteristic informal pattern of organization contain increased amounts of space; and the space is so organized that maximum flexibility in use is made possible.

The acceptance by the school of its share of responsibility for physical, social, and emotional growth and development, in addition to the original sole concern for intellectual growth and development, goes farther than increasing the amounts of space merely.

For example: concern for physical growth and development has added indoor and outdoor facilities for physical education, organized and free play activities, rhythmic activities, etc. Another example: concern for social and emotional growth and development has resulted in design to achieve relaxed, child-scale, pleasantly attractive, home-like environments, rather than the more traditional compact, institutional type structures of the past.

Profound changes have occurred also in the diverse kinds and amounts of equipment and instructional materials. Classrooms are designed and equipped as laboratories for purposeful group and individual planning, study and research, and evaluation. Such rooms must have movable pupil furniture, efficient storage facilities, and must be provided with maps, globes, radio, record player, library corner, book cases, reference sources, easels, work benches, sinks with hot and cold water, aquariums, herbariums, working surfaces for construction of models, display facilities, etc.

Not only has the area of classrooms increased, outdoor areas have been added to the classrooms by connecting doors. These outdoor areas provide space for many activities calling for gross physical movement, for construction, planting and growing, etc. The connecting doorways, especially for younger children, should be designed without steps.

With the wide range of activities now common to the elementary classroom, and with several of these activities going on at the same time, the problem of space organization becomes particularly important. There has been a trend toward providing isolation of noisy activities in alcoves or adjacent space partitioned with clear glass. A more recent trend adds to the flexibility of classroom area. This is the movement away from the long, narrow rectangle toward the square, which allows the provision of separate activity centers with economy of travel distance.

The concept of flexibility in space organization to allow the fullest possible use of the space calls for the provision of furniture which may be moved quickly and easily. Furniture which is stackable is widely used because it readily frees a larger proportion of the floor for varied activities.

D. Types of Activities

As individuals or as groups, children may engage in any or all of such activities (suited to maturation levels and to individual differences) as the following:

1. Use books and printed materials, including charts and posters. Each classroom is supplied with a variety of books having a wide range of reading difficulty. Some of the charts and posters may be made within the classroom.

Facilities needed include: storage for books, charts, and other printed materials, and for the paper and supplies used in the making of charts and posters; chalkboard, tackboard; devices for hanging charts; display shelves for books and other printed materials; table and chairs for reading center.

2. Meet in large and small groups for planning, discussing, presenting reports, listening, observing. Children may be placed into sub-groups having nearly equal levels of ability and accomplishment for reading and study. Committees may be organized to engage in different activities. Three or more clusters of children may be purposefully active in a classroom at one time.

Facilities needed include: enough space for plenty of elbow room between the various activity centers; movable furniture so groups can face each other informally; furniture which may be arranged to provide generous working surfaces; storage facilities for the wide range of instructional materials which may be used.

3. Write stories, reports, letters, poems, articles, word lists, notices; and use workbooks and other materials which require writing.

Facilities needed include: pupil furniture with a range of dimensions suited to the maturation level of the group and individual differences among the group; storage for writing materials and personal storage for each pupil for his working materials.

4. Experiment with objects and materials in studying and investigating scientific phenomena.

Facilities needed include: some basic and elementary science equipment, especially for the upper grades, such as microscopes, magnets, etc.; herbariums, terrariums, aquariums; storage facilities for equipment and supplies.

5. Use tools and materials for functional research -- for example: to acquire mathematical concepts, to learn about handling money, to make models or replicas in social studies activities, etc.

Facilities needed include: ample space in which to work and movable furniture so space can be cleared, work bench, tools, surfaces sufficient to hold models and the items constructed for use in the learning activities and for display, storage for tools and materials.

6. Participate in aesthetic activities -- art, music, structured and unstructured drama and other oral expression, dancing and rhythmics -- to acquire appreciation, explore interests, gain information and skills for leisure time pursuits.

Facilities needed include: in the classrooms, ample space with movable furniture, proper design for sound control, electrical outlets, record player, radio, piano in classroom of younger children, orchestral instruments for grades above the third grade, rhythmic and simple musical instruments for younger children, easels, plenty of tackboard, ample storage for musical equipment, art equipment and supplies.

Supplementing the classrooms, there needs to be ample indoor area for assembly, dramatic activities, dancing, etc. In this space there should be pianos, record players, etc.

7. Use audio-visual aids to supplement the study-investigation-aesthetic activities.

Facilities needed include: properly designed electrical system, means for light control for projection, projection equipment, mounted pictures, maps, charts, globes, tape recorder, radio, display facilities for permanent and changing exhibits, etc.

8. Engage in hobbies, especially collecting hobbies. These activities grow out of or supplement the normal activities of science, social studies, and aesthetic pursuits.

Facilities needed include: ample surfaces for open display and facilities for protected display. Secure storage for materials and objects not on display.

9. Take part in various physical, investigating, and appreciational outdoor activities -- structured or unstructured, directed or free.

Facilities needed include: a well-organized and spacious site.

E. Supplemental and Auxiliary Facilities

It should be apparent that the educational philosophy and practice presented herein tends strongly to conform to the concept of the self-contained classroom. No extreme advocacy is intended, however. It is recognized, for instance, that under certain circumstances some special use facilities may be well-used to supplement what goes on in the classroom -- space designed for instrumental music, space designed for crafts, facilities for school food service, facilities for assembly, dramatics, dancing, etc., school library (with librarian), etc. (A more recent trend substitutes an instructional materials center for the library.)

Obviously the educational specifications, for which the educational personnel of the planning team have basic responsibility, must be prepared in terms of fundamental decisions regarding the type of program organization to be followed in the school. The relationship between what goes on inside and outside of the classroom should dictate the design. The reverse should not be true.

This relationship is not quite so decisive with respect to the design of auxiliary spaces such as administrative suite, including administrative offices, health and isolation facilities, supply storage, teachers' work facilities and lounge, toilet rooms, custodial facilities, facilities for meeting of patrons, etc. -- all of which are of critical importance.

F. Planning With a Look Ahead

The succeeding chapters deal more intensively with planning procedures and with the kinds, amounts, and organization of elementary school facilities. What has been said up to this point is intended to furnish a starting point and give direction to the study and research needed to provide a basis for the formulation of the educational specifications. The following chapters contain more specific points of reference to serve as a guide to the preparation of the educational specifications.

Chapter II

PLANNING PROCEDURES

A. A School Plant Should Be Planned as a Part of a Long-Range Program

The greatest assurance of long-time district-wide economy can be had only when each school plant is conceived as a step in carrying out a previously planned long-range program of school plant needs. The procedures in formulating a district-wide, long-range program of school plant needs are well known.[1] Briefly, the major steps include the following:

1. Forecasting the school population. A short-range (five years) estimate of school enrollments can ordinarily be made with some confidence. But costly mistakes (overbuilding or underbuilding) may be made unless the long-range probability of increases and decreases and the extent of these possible changes are carefully weighed. All of the factors which might cause changes in school population should be studied.

2. Appraising existing school plants. Existing school plants should be evaluated in terms of:

    a. Structural safety
    b. Satisfactoriness as to factors of health and comfort
    c. Satisfactoriness as to educational utility
    d. Feasibility of remodeling, rehabilitation, and modernization
    e. Relationship to desirable organization of attendance areas

3. Formulating the master long-range program. On the basis of the predicted school population and the appraisal of existing facilities, specific needs may be itemized and listed and assigned priorities.

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[1] See the references listed at the end of this publication, particularly the publication of the Utah State Department of Public Instruction, Planning a Program of School Plant Construction.

The natural uncertainty of remote needs obviates priorities for them, but nonethe-less such needs should be listed.

Some of the recognized advantages to be had from the formulation of a long-range program of school plant needs (and we should add that this is not a single event in time, but a continuous process) should be mentioned here.

1. Eventual realization of the most economical organization of school centers and attendance areas (including desirable age-grade organization of schools).
2. An approach to equal educational opportunities for all school children in the district.
3. District-wide support for the building program and the financing program.

B. The Overall Steps in Planning a School Plant

The procedures essential to good planning of a particular construction project may be considered as coming within several major steps.[2]

1. Setting up the planning organization and outlining the procedures to be followed.
2. Formulating the educational specifications.
3. Selecting the architect.
4. Selecting the site.
5. Developing preliminary plans.
6. Approving final plans and specifications.
7. Working with the State Department of Public Instruction.

1. The Planning Organization and Procedures.

a. For the planning of a school plant, vigorous, competent leadership is the key to success of the planning team.

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[2] See the references at the end of this publication, particularly the publication of the Utah State Department of Public Instruction, Planning a School Plant -- The Educational Specifications.

While there is no single good organizational pattern yet experience has shown that the educational planning group is best:

(1) When there is wide participation -- members of the superintendent's staff at the district level, principal, teachers, representative citizens

(2) When the citizens have been selected so that influential agencies are officially represented.

(3) When the members are so chosen that they will be working members, not mere window dressing only.

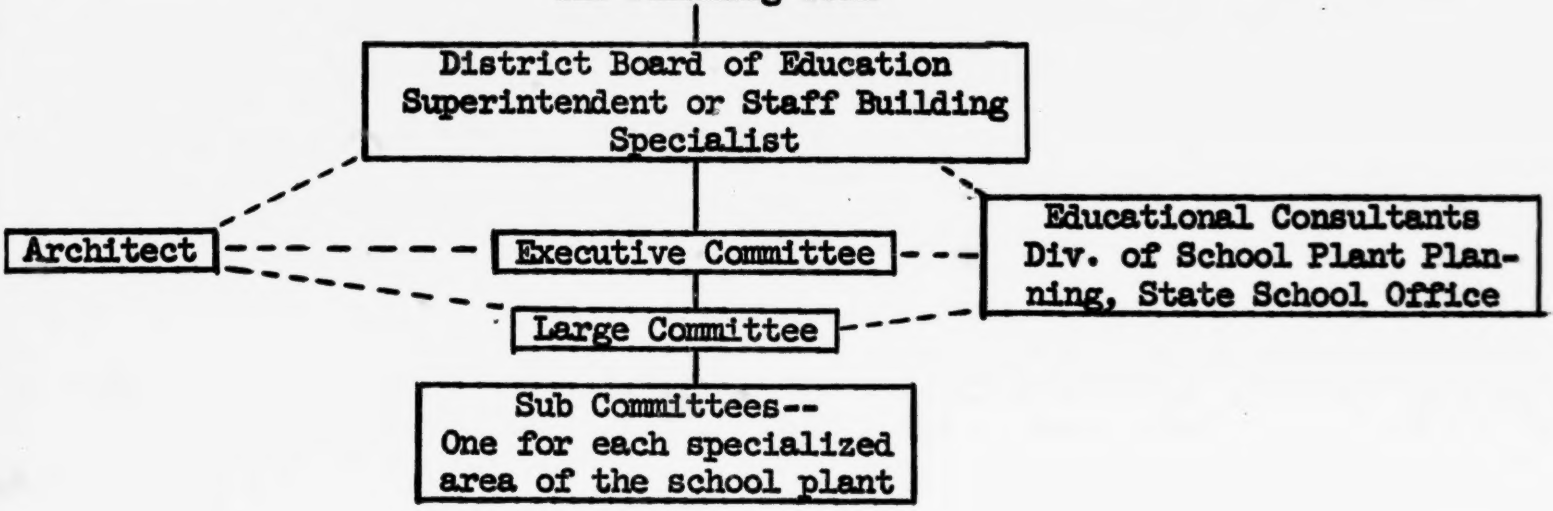
(4) When the activities of the planning committee are scheduled so that it is a research and problem solving group, not a rubber stamp, approval group merely.

(5) When sufficient time is allowed for the work of the planning group -- at least one year for a complete school plant.

(6) When the architect has been selected in time to be available to the committee for consultation during the preparation of the educational specifications.

(7) When a timely use is made of competent educational consultants, including the staff of the State Department of Public Instruction.

Suggested Organizational Pattern
The Planning Team


District Board of Education
Superintendent or Staff Building Specialist
Architect
Executive Committee
Educational Consultants
Div. of School Plant Planning, State School Office
Large Committee
Sub Committees--
One for each specialized area of the school plant

b. The planning procedures should follow in logical sequence.

(1) A study of the community -- the cultural and economic setting for the school.

(2) A study of school population.

(3) A definition of the educational program.

(4) A study of the kinds, amounts, and organization of space and facilities needed.

(5) The formulation of the educational specifications.

2. Formulating the Educational Specifications.

The format of the educational specifications may vary, but the content should be comprehensive and presented in language easily understood by the architect. The following outline of content is taken by permission from School Plant Studies BT-1-24, American Architectural Foundation -- American Institute of Architects, January-February, 1955.[3]

Recommended Content for Educational Specifications

General Considerations
BRIEF DESCRIPTION OF EDUCATIONAL PLAN

Program considerations
  General statement of philosophy
  General characteristics of the community
  General characteristics of the student body
  General characteristics of the curriculum
  General relationships of this school to the school system

Administrative considerations
  Description of attendance area
  Description of grades and groups to be accommodated
  Anticipated enrollments by (1) grades, (2) years, and (3) courses
  Personnel requirements

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[3] This issue of School Plant Studies is one of two issues devoted to the same subject. Their content is derived from articles by Russel E. Wilson which appeared in The Nation's Schools, Vol. 56, Numbers 4 and 6, 1956.

BRIEF DESCRIPTION OF PHYSICAL PLAN

General character of the building
- Architectural style
- General type of construction
- General atmosphere to be created by the building
- Major sections or units of the building
- Preferred number of stories

General facilities required in the building: instructional, noninstructional, and community use areas

General characteristics of the site: location, size and dimensions, physical description (topography, soil, and so forth), and available public utilities.

Detailed Statements of Desired Spaces and Educational Program

INSTRUCTIONAL SPACES

- Required numbers and kinds of rooms
- Descriptions of the program, functions and facilities for each room
  - Sizes and kinds of groups to be accommodated
  - Types of activities to be provided for
  - Location and relationship to other facilities
  - Physical arrangements and features
  - Descriptions and lists of the equipment, furniture and materials
  - Teaching methods

NONINSTRUCTIONAL SPACES

- Required numbers and kinds of rooms
- Descriptions of the functions and facilities for each room.
  - Sizes and kinds of groups to be accommodated
  - Types of activities to be provided for
  - Location and relationship to other facilities
  - Physical arrangements and features
  - Descriptions and lists of the equipment, furniture and materials

DETAILS: lighting, acoustical, hardware and lock systems, floor and wall surface

MECHANICAL SYSTEMS: ventilation, plumbing and heating

UTILITY SERVICES: electrical power systems, fire alarm systems, gas service, sewage systems, communication systems, clock and program systems, and water supply.

3. Selecting the Architect.

Because of the critically important role of the architect as a member of the planning team, great care should be used in his selection.

A recommended standard questionnaire to be filled out by the prospective architect has been published by the National Council on Schoolhouse Construction (jointly copyrighted by that organization and the American Institute of Architects.)

The content indicates the major factors which should be considered by the board of education. The screening procedures should be deliberate and carried out with due regard for the dignity and professional integrity of the applicants.

A word of caution is in order in case the screening includes visits by the board to buildings cited by applicants. It is hard for trained people to make evaluations of buildings which will be in agreement. It is harder still for boards of education to make valid judgments of buildings. Such visits, then, should not be allowed to overshadow other considerations. The fact that an architect has at some time in the past worked out satisfactory solutions to design problems is not pertinent as the answer to the question, "Is it his practicing habit to approach the solution of a design problem each time it is met on the basis of fresh research?"

The quality of architectural service, like the quality of building materials, tends to be determined by what you are willing to pay for it. For this reason selection of an architect on the basis of fee competition is a handicap rather than an advantage. Moreover such a procedure violates the code of ethics of architects. Whatever the fee, it is still a very small amount when compared to the lifetime cost of the facilities which the architect, more than anyone else, is in the best position to control. The best architectural service is the cheapest regardless of its cost.

4. Selecting the Site.

For various reasons it is desirable for school sites to have been selected well in advance of the time for the planning of the buildings. Criteria for site selection and use are presented in Chapter III, below. But in cases where a new site must be selected at the time the buildings are to be planned, the services of the architect will be valuable. In any event, evaluation and study of the site for its best possible use is an importsnt part of formulating the educational specifications.

5. Developing Preliminary Plans

The educational specifications become the basis for the architectural program. The educational specifications, which mark the culmination of the educator members of the planning team's chief contribution to planning, have to be translated by the architect into his own program, within which he makes his own unique contribution to planning.

The first step taken by the architect, following the formulation of his program, is to make single line schematic drawings. Often there will be many different schematics to be reviewed by the educator members of the planning team.

The next step of the architect is the development of preliminary plans. It is during this stage that decisions are made regarding kinds, amounts, and organization of space; and about structural design and finish materials, as well as the design of the visual, thermal, and auditory environments. Frequent conferences are necessary between the architect and responsible school personnel. It is during the development of preliminary plans when consultation with the staff of the State Department of Public Instruction (arranged through the Division of School Plant Planning) is most helpful.

The preliminary plans should include all of the architectural drawings of the final plans, including floor plans, elevations, and interior sections. Essential detail of cabinet and casework should be shown, as should floor, wall, and ceiling finishes. The elements of the design for the control of the visual, thermal, and auditory environments should be established before the preparation of final plans and specifications is undertaken.

In the interest of securing the best possible and most economical plans, two policies are of critical importance. First, the architect must be allowed sufficient time for research and study of design problems -- desirably not less than one year for a school plant of substantial size; and second, the architect should be given the greatest possible freedom for the exercise of creative talent and the coordination of the many design factors.

The architect should be requested to submit to the board early schematic drawings of his proposal and as these are refined cooperatively between the school board and the architect it is desirable to have a model made up to demonstrate the finished building.

6. Approving Final Plans and Specifications.

The final plans and specifications provide the final check on all of the preceding planning. Because of this, every detail should be reviewed to make sure that nothing has been overlooked and to be sure that all elements have been coordinated. Change orders after construction has started are sometimes necessary, but it is better to have the plans so complete that change orders are held to a minimum. Moreover, boards of education and responsible school personnel should be so familiar with the plans and specifications that there will be no surprises and no disappointments when the buildings are ready for occupancy.

7. Working With the State Department of Public Instruction.

The laws of the State of Utah require that before school construction costing in excess of $20,000 in the school districts may be undertaken, the signed approval of the State Superintendent of Public Instruction must be secured on the final plans and specifications (which must have been prepared by a licensed architect). The law also authorizes the State Superintendent to prepare a code to govern the preparation of plans and specifications for such construction.

The State Department of Public Instruction has prepared a series of publications to serve as guides to school plant planning, thus discharging the "code" obligation of the law. It is the established policy of the State Department to provide leadership through consulting service rather than to exercise regulatory authority under the law.

Through the Division of School Plant Planning, this service is made available to school personnel and to architects and engineers upon request. The Director of the Division acts as an agent of the State Superintendent of Public Instruction. He receives and reviews plans and secures the services of the various staff members of the Department to review the plans for facilities in their respective areas of the curriculum. It is most common for a district superintendent or his staff building specialist together with the architect to come to the State Offices for conferences on plans. Very often the architect is authorized by the local board of education to work at his convenience with the State Office.

Obviously, consultation service is most helpful during the development of preliminary plans. Use of the service by school districts is voluntary. Legally, it is necessary only to present final plans and specifications for review and approval. But it is equally obvious that final approval will be both more meaningful and expeditious after preliminary plans have been in for review.

Chapter III

OVERALL PROBLEMS OF SPACE AND SPACE ORGANIZATION

A. How Big Should The School Be?

Except in the abstract there is not a single good answer to this question. Hard realities interfere with the ideal--density and distribution of population, availability of sites, the existence of school buildings considered to be too good to abandon, attitudes of the public with respect to consolidation of school centers and transportation of pupils, etc. Nevertheless the "abstract" good answer should be stated in terms of principles which may serve as guides or as goals to strive for in the making of decisions with respect to school centers and attendance areas.

The idea seems to be a good one that a school may be either too large or too small for the most effective and most economical operation--whatever the quantities may be which are considered to be "too large" or "too small." Some opinions as to optimum size are summarized below.

But first, the case made as a support for a recommended size is usually based upon one or more of the following considerations. (No value is intended by the order of mention.)

1. The sheer arithmetic of the time schedule of use of the various spaces--particularly of general-use and special-use spaces.
2. The number of children required in order to provide the developmental educational and social experiences on an economical basis. This applies especially to decisions regarding retention of small schools.
3. The number of children in the school community beyond which it becomes hard to recognize and deal with children as individuals--

beyond which it is not easy for children to identify themselves with the group and feel that they are known and accepted and that they belong.

Each of the three considerations named above may be worded as a principle which can be used as a point of reference or as a guide to the making of policy on the organization of attendance areas and establishment of school centers. For example:

1. Other things being equal, the elementary school should have a population which allows maximum desired experience by children in the general and special-use spaces--for example: indoor play-physical education and auditorium-assembly spaces; crafts, music, library, etc. spaces.

It is a matter of simple arithmetic. If the desired educational program calls for a given number of minutes per day or periods per week in the various general-use and special-use spaces, and if there is a given number of class groups who should have such opportunity, then the number of the respective general-use and special-use spaces needed can be easily determined. A larger number of such spaces than needed is a waste of money. A smaller number is if possible, more serious because it is a subtraction from educational opportunity for children.

If we assume that in any event it will be the decision to provide the facilities needed to implement the educational program, then it is generally better to duplicate the required general-use and special-use facilities within entirely separate and smaller schools. There can be little saved in capital outlay by duplicating the facilities within the same school plant; and much of educational value can be lost thereby.

2. Other things being equal, the school should be large enough to allow the provision of a rich and varied educational program on an

economical basis. The sad fact is that in the case of small schools "other things" are seldom "equal." The report to the President of the 1956 White House Conference recommended that with rare exceptions it is better to have a school which is too small than to require elementary pupils to ride more than 45 minutes between home and school. The point should also be stressed that an educational program in a small school that approaches that of larger schools in variety and quality must inevitably have higher unit costs.

3. Other things being equal, the elementary school should be small enough so that each child may be known and treated as an individual; and so that the individual may readily see himself in perspective with the group. In the large school the pupil tends to be a statistic rather than an individual child. Moreover, it is felt that the incidence of behavior problems increases with school size. It is likely that the necessary emphasis upon conformity in the large school creates a social climate which is not conducive to the fostering of individual genius.

What, then, is the optimum size for an elementary school?

The National Education Association Department of Elementary School Principals adopted a resolution at their 1954 convention in Atlantic City declaring that the interest of the child can best be served when class size is no larger than 25 pupils and when the school population is no greater than 500 pupils.

A poll of superintendents conducted in 1954 by The Nation's Schools showed the largest group (49%) favoring an elementary school population within the range of 350 to 500 pupils. The next largest group (20%) favored the range between 250 to 350. Only 14% of superintendents preferred schools larger than 500 pupils.

The optimum size for an elementary school probably is that which justifies a full-time supervising principal; and which allows the provision of general-use and special-use facilities (or in other words, a rich and varied program plus special services) on an economical basis. A school containing a kindergarten and two teaching groups for each grade level through the sixth grade is probably the ideal.

Mention should be made of certain devices which are successfully used to relieve the problems of large schools. For example, large schools have been organized into clusters of separate buildings on a large site, which permits the realization of some of the values of the small school within each of the separate buildings. Another plan which has been well accepted is the establishment of one or more small neighborhood schools near to the homes for children of primary school age.

B. Spaces Needed to House the Program

One never sees space alone. To see it and use it space must have definition. For the school building, space is defined by the building envelope, internal walls, floors, ceilings. All are essential. No one element stands alone. Nevertheless, for the sake of emphasis, it may be said that space is the chief ingredient of the satisfactory school plant. The kinds and amounts of space provided, and the way the space is organized, determine to a very large degree the satisfactoriness of the school plant--now and for the future.

The principle of flexibility with respect to structural design is mentioned in Chapter IV, below. The concept of flexibility is related also to space organization. A plus of usefulness may be added to space--utility now and for the future--by capitalizing on flexibility through the manner of space organization. Some of the factors of flexibility with respect to space arrangement are worth mention to give further meaning to the concept. For example:

1. The amount of area within any one space (especially classrooms, special-use, general-use spaces). The number and kinds of activities which can be carried on is determined most critically by the factor of area.
2. The adequacy, suitability, and convenience of storage facilities.
3. The placement of utilities and service facilities.
4. The use of modular and movable casework, furniture, and equipment.

One other general point is worthy of repeated emphasis. The ways in which space is organized have a great deal to do with the degree of enjoyment of the occupants. The emotional-aesthetic-psychological climate may be determined in large measure by the design of space. The values indicated by the word "climate" as used here are real values. As such they should be considered as part of the utility to be sought in a maximum return for capital outlay.

Without any intention to establish an official nomenclature the spaces of the elementary school plant might be listed for convenience under the following categories: (These various spaces are dealt with at length in Chapter V, below.)

1. Instruction spaces
2. Administrative spaces
3. General-use spaces
4. Service spaces
5. Connecting spaces
6. Outdoor spaces

C. The Elementary School Site--Selection and Development

The initial selection of school sites desirably should be a part of community planning. The criteria for selecting good sites may thus be better observed. Also, it is well to anticipate the need for school sites and acquire them well in advance of actual use. This is not only a significant economy measure, but gives greater assurance that sites may be well located and secured at a time when enough land is available so the size of the sites will be adequate.

1. Criteria for Site Selection. School sites often must fall short of meeting fully all of the criteria of a good site. Conditions may force compromises. Nevertheless compromises should be resisted in the interest of preserving important educational values. The following criteria, worded in various ways, seem to be generally accepted. It should be noted that these criteria are interrelated.

a. Suitability for the educational program is a major criterion, and is determined by several factors, chiefly:

(1) Size and dimensions must be considered together. Irregular dimensions detract from the usefulness of a given acreage. In general, a rectangular site lends itself better to economical placement of the building and to the organization of outdoor spaces.

With respect to recommended minimum size for a satisfactory elementary school site, the position taken here is in harmony with that of the American Association of School Administrators and the National Council on Schoolhouse Construction. The minimum should start with five acres and add one acre for each 100 pupils.

The organization of the outdoor space of the school plant is essentially the same kind of problem which must be solved within the building. The educational program is the starting point.

A good method to follow is to use scale templates of the various spaces and to try various layouts. The amount of acreage needed may also thus be determined--always allowing for future expansions of the program.

(2) The topography, or gradients, of the site affects its suitability for the educational program, and also influences the cost for building construction and site development. Many of the outdoor activities demand surfaces which are level, and many others call for only slight slope. Excessive grading can be expensive.

(3) The nature of the top soil and sub soil affects the type of landscaping which can be done; and also influences the treatment of the various surfaces (sod, black top, etc.). The design and cost of footings and foundations, the extent and type of fill which may be required are dependent upon sub soil conditions. The existence of water, either surface or underground, on a site must be studied as a factor affecting the suitability of the site.

b. Satisfactoriness of the site environment is an important criterion. The setting of the site should be attractive and quiet. Zoning should protect the school against noisy, odorous, and hazardous industrial and commercial activities. It is not too much to expect that the school should add to the character of its setting in the community as well. Consideration of environment as a site criterion leads logically to the criterion of location.

c. The location of the site is a critical criterion with respect to the following factors:

(1) Centrality is desirable although other factors may take greater weight. Aggregate travel distance of those attending school is directly related to centrality.

(2) Accessibility and safety of approach are factors of location which should not be sacrificed.

(3) Availability of utilities and service lines can often be controlled by choice of location without sacrifice of other important factors.

d. Cost of site acquisition and development is mentioned here not so much because it is a valid criterion for site choice, but because cost should not be given decisive weight at the sacrifice of other criteria. It is short sighted to save money at the expense of site adequacy. The cost of the site should be considered as spread over the life expectancy of the school building. It doesn't look so big that way.

2. Site Development. The plan for site development should be made along with and as a part of the plans for the building to be located on it. This is just as true in cases where elements of the program for site development must be deferred until a future date. The reasons for this are obvious and need not be mentioned.

The suggestions was made above that the starting point for site organization is the educational program. The technique of using scaled templates was also suggested. The further recommendation is now made that the following factors should be considered:

a. Accessibility between building and site. Ready access to outdoor areas from the building depends upon the design and the location of the building. For example, it is possible in a single story structure to provide each classroom with an outside door and an outdoor extension of the classroom. And the design of the building can make it possible for the teacher to give simultaneous direction and supervision of indoor and outdoor activities. Another example of accessibility between building and site is the location of toilet rooms and the provision of ready access to them from outside play areas.

b. Circulation. Utmost care should be exercised to facilitate traffic to and into the building and from the building to the various areas of the site. There should be a minimum of crossing over of one organized area to get to another. The approach to the building for children arriving at school should provide a convenient separate approach and entrance for kindergarten and primary grade children.

c. Isolation. If for no other reason than to minimize administrative and supervisory problems, the interrelationship between the building and the outdoor areas should provide relative isolation of groups according to maturation level. Not only is it wise to protect younger children (even to the point of using hedges or fences), but it is desirable to give plenty of room for games participated in by children in the upper grades. Here the simple provision of enough spaces accomplishes the needed separation of activities.

d. Safety. Safety is intrinsic in the three factors named above--accessibility, circulation, isolation. But safety may be seen as a factor by itself in site organization. Access service drives, bus turn arounds, automobile parking, the kind of protective surface provided around and under play equipment. The surface of the various activity areas should be suited to the activity, but free from abrasive materials. Paved surfaces should be free from loose particles. There are advantages to organizing the outdoor spaces so that the areas adjacent to the building are treated with a combination of smooth, hard surface and a good, tough sod. Safety and indoor housekeeping are both well served thereby.

e. Aesthetics. The good effect of a pleasant, attractive environment on the growth and development of pupils is sufficient justification for planning the site according to aesthetic values. Responses of pleasure and appreciation shape the attitudes of children not only to the environment but to all that goes on in it.

Chapter IV

SPECIAL PROBLEMS IN DESIGN AND CONSTRUCTION

A. Economy

The heart of economy in school plant capital outlay is not how little can be spent, but how much we get for what is spent. Educational utility is worth what it costs in the competitive market. Getting something that is less useful at a lower price is not a good bargain. Assuming educational utility, economy has meaning in two chief points of reference--initial cost and long-time cost of maintenance and operation. Low first cost contributes to economy only when it does not result either in loss of educational utility or in undue added long-time costs of maintenance and operation. Engineering studies are often necessary to arrive at a proper balance between first cost and long-time costs.

The most important controls of economy lie in the care taken in educational planning--the long-range projection of school plant needs and the formulation of educational specifications for a particular project. The architect is professionally committed to the goal of economy, but his effort may be limited by unwise or careless educational specifications. It is suggested that there should be close cooperation between the educational members of the planning team and the architect during the preparation of the educational specification and that there should be equally close cooperation between the architect and the educational personnel as the architect formulates his architectural program on the basis of the educational specifications. The presentation of schematics, outline specifications, and preliminary drawings afford the best opportunities to check on the architectural program.

In the interest of economy the architect should be given the widest possible latitude and freedom, consistent with the educational utility of the resulting facilities, in working out solutions to design problems in:

a. The perimeter and shape of the building

b. Modular coordination

c. Economical use of floor space and securing a high percentage of "productive space" in the gross area of the building

d. Choice of materials and methods of construction

Everyone concerned should be aware of the importance, for economy, of having the plans and specifications complete in all details and of having all of the elements of the plans and specifications coordinated prior to bidding.

In addition to the foregoing ideas, boards of education should be aware of other points in school plant capital outlay where decisions may be made to achieve economy. For example:

a. In setting the time for bidding. Bids are lower at seasons of the year or at times when contractors are hungry for jobs.

b. In the program of financing. Interest on bonds are a proper part of the building costs.

c. In providing competent supervision of construction by a clerk of the works.

d. In making sure, through the signed agreement with the architect, that competent consulting engineering service will be used by the architect. The architect should not be permitted to use the services of agent engineers to design important elements of the building; for example, the mechanical and service systems.

Boards of education and educational leaders should be aware of the danger of false economy. Any solution to a design problem which is based soley on the idea of saving money should be carefully evaluated to make sure that there is no resulting loss of utility or addition of operation and maintenance costs. One example of what may be false economy is a temptation to repeat designs in successive schools in order to reduce architect fees. The mere reduction of fees may not justify the reuse of a particular set of plans and specifications. In any school facility there are bound to be some defects that could be corrected if we take advantage of the experience of living in a facility. To repeat another building with the same defects does not seem to be advisable nor in harmony with good planning for educational purposes. The architect should have the opportunity to use his creative talent in not only rectifying defects in the previous building, but also to take advantage of current improvements in materials and construction methods. Improvements in previous designing solutions are always possible and usually desirable. It should be remembered that architect fees saved by this means would constitute an insignificant expenditure if prorated over the lifetime of the building being designed. This is not to say that a building should not be duplicated with only minor modifications in the plans to make possible the improvement of the design and the deletion of some defects in the original building.

B. Increasing Utility Through Flexibility of Design

Increasing the educational utility of school buildings through the application of the principle of flexibility in the organization of space was treated above in Chapter III. Following are some ideas regarding the application of the principle of flexibility to structural design. Of course, the two applications must be considered together. For example, the spatial approach to school building design starts with a conception of the program of activities to be carried on, and hence with the kinds and amounts of space needed and their organization. But the building envelope and internal walls not only define the perimeters of the various spaces, they are important means for controlling the visual, auditory, and thermal environments. The walls also provide surfaces for instructional equipment and activities as well as storage facilities, the arrangement of which affects the freedom with which the space may be adapted for various activities.

The structural design of the school building should allow for the ready and inexpensive alteration of the internal spaces within the building envelope. The reference point always is the educational utility of the spaces; flexibility, itself, is not the ultimate end. But consideration should be given to the location of bearing walls and placement of mechanical and service systems. The type of material used in curtain walls is related to the ease of altering the size and dimensions of rooms.

The design for natural lighting is also critically related to flexibility. For example, if the sole function of sidewall windows is for visual connection between the interior and exterior, and natural light is introduced from overhead, the banks of artificial lights can be placed vertical to the exterior wall according to structural modules rather than horizontal; and switches and outlets need not be altered when the rooms are changed in dimension.

Structural design should allow for expansion of the building. Corridors should extend to the building perimeter or at least be deadened against a space through which the corridor may be extended without reducing the space to the point where it may not be useful.

With respect to possible future expansions or additions, one critically important point should not be forgotten in the design of the initial unit of the building. It is this. In the design (space organization and structure) of the first unit, the completed or ultimate building should be projected at least in single line drawing.

The amounts and kinds of spaces needed and the organization of space in the ultimate plant must influence the design of space in the first unit. Unless the projection is made, there is the real danger that ultimate space organization will be awkward and that certain spaces may be inadequate or omitted. Particular attention should be paid to the capacity of the mechanical and service systems so that they will be adequate for the ultimate plant. The same is true for the capacities of general and special-use facilities to be included in the first unit (for example: administrative and service areas, and auditorium and gymnasiums and related areas).

C. Visual Environment

Awareness is increasing of the relationship between the quality of the visual environment of the learning process and the learning achievement of school children. It is becoming recognized that ease in seeing, or visual comfort, depends primarily upon the quality of the visual environment rather than upon the quantity and distribution of light merely.

Traditionally, the design for school lighting has been concerned primarily with the quantity of light expressed in foot candles. In the recent past increasing attention has been given to the program of controlling excessive brightness of surfaces within various "visual fields" within the classroom. At the present time this effort to control brightness has reached the point where the concern is for the quality of light in the total visual environment of the classroom. The critical unit of measurement in determining the quality of light is the foot lambert. And light quality depends upon holding the foot lambert brightness of the various light emitting and light reflecting surfaces in the total visual environment within acceptable ratios of contrast.

We are in a period of extensive experimentation in the design for school lighting. Ideas are still fairly fluid even in the design for the quantity of light, where many ideas in design have been tried and proven. But ideas are as yet relatively few in the design for controlling light quality. In this bulletin, the position is taken that further experimentation, especially in design for assuring visual comfort, should be encouraged--experimentation based upon careful engineering and cost studies looking toward the achievement of the goals listed below. These goals should be sought wherever critical seeing tasks are performed.

The National Council On Schoolhouse Construction has announced seven goals with respect to brightness contrasts within the total visual environments as follows:[4]

Goal A - The foot lambert brightness of any surface viewed from any normal standing or sitting position in the schoolroom should not exceed ten times the foot lambert brightness of the poorest lighted task in the room.

Goal B - The foot lambert brightness of any surface viewed from any normal standing or sitting position in the schoolroom should not be less than one-third the foot lambert brightness of the poorest lighted task in the room.

Goal C - The foot lambert brightness of any surface immediately adjacent to the task should not exceed three times the brightness of the task.

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[4] Guide for Planning School Plants. National Council on Schoolhouse Construction, Revised 1953, pp. 156-157. W. D. McClurkin, Peabody College, Nashville, Tennessee.

Goal D - Brightness difference between adjacent surfaces should be reduced to a minimum.

Goal E - The brightness goals stated above assume a lighting system that provides from twenty to forty foot candles on the poorest lighted task. As foot candle levels are increased sources of high brightness should be controlled to approach more nearly the brightness of the task. The extent of the area of the surface producing brightness has a measurable effect upon visual comfort. Generally, small areas of either extremes of brightness are less noticeable than large areas of the same brightness.

Goal F - Light distribution from any light source should be of such a nature that direct glare and reflected glare are eliminated for the observer to the greatest degree possible.

Goal G - These objectives or goals should be achieved without the loss of a cheerful, friendly, and aesthetically pleasing classroom environment and with the need in mind for a balanced and acceptable thermal and auditory environment.

Terms Used in Lighting.

Foot Candle - Illumination of a surface one foot from light source of one candle.

Foot Lambert - The product of illumination in foot candles and the reflection factor of a surface. Candles per square inch is the unit of brightness of a light source, but for calculating brightness balance in the visual environment it is simpler to use the foot lambert unit for both light-emitting and light-reflecting surfaces. (The brightness of a light-emitting surface may be translated into foot lamberts by multiplying candles per square inch by 452.)

Brightness--Luminous intensity of any surface.

Reflection Factor--Foot candles reflected by a surface divided by the foot candles falling upon the surface (expressed as a percentage). This is an important factor to consider with respect to both light distribution and brightness balance.

Psychological Factors in School Lighting.

The quality of the visual environment in school buildings has a profound psychological impact upon their occupants. Visual comfort or ease of seeing reduces tension as well as anatomical and physiological strain. The energy output for critical seeing is determined in large part by the quality of the visual environment.

The design for school lighting inevitably contains certain elements of considerable psychological importance over and above their effect upon seeing ease. Some of these elements are mentioned here as a reminder to consider them in the design for school lighting.

It is important to provide visual connection between the inside and outside of instructional spaces in the school building at normal seeing levels. If the design relies completely upon overhead lighting (either natural or artificial) rather than upon side wall fenestration, it is essential to provide visual connection with the outside by vision strip windows.

The color treatment of instructional spaces has psychological values beyond its effect upon brightness balance and light distribution. The reflection factor varies according to hue and type of finish and hence affects the quality of the visual environment as defined in the "goals."

The rules are well known and need not be repeated here for controlling the reflection factors of major surfaces in the room to gain maximum light distribution and for controlling acceptable brightness ratios among both major and minor surfaces.

But it is possible to give this relationship full weight and still vary the color treatment of the many spaces to realize the psychological values of attractiveness and cheerful color climate. Variety from room to room is considered by many to be important. Variety in color treatment can be had at little, if any, additional cost. Accent colors, if confined to small areas, can be used to punctuate mass colors without destroying acceptable brightness ratios.

The rules for color treatment are also well known, but a brief summary of major points may be in order. Seagers uses the following popular terms to classify colors: stimulating, relaxing, neutral, depressing, warm, cool, approaching, receding.[5]

Colors may be selected for treating various rooms according to their location or orientation, their size or shape, or according to the nature of activities to be carried on in them. Spaces in which relatively little natural light enters may be treated with warmer colors. Conversely, rooms having more natural light and warmth may better be treated with cooler colors.

Smaller rooms may be treated with receding colors and large rooms with approaching colors. Stimulating and relaxing colors may be varied in their use according to the nature of the activities to be carried on in the spaces. The apparent shape of a room may be altered by the use of approaching and receding colors.

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[5] Developing the Color Treatment For School Rooms, by Paul W. Seagers, Illuminating Engineering, Vol. XLVIII, No. 6, June 1953, pp 296-298.

Reds, oranges, and pinks are both warm and stimulating. Blues and greens are cool and relaxing. Grays generally are neutral, while most purples are depressing. A cool tint is most receding and warm saturated colors are most approaching.

D. Thermal Environment

It is well known and generally recognized that the thermal environment in the school has a direct and positive bearing upon the health and body comfort of the occupants, and hence upon the learning and accomplishment of pupils. The heating and ventilating systems of the school are the chief means for controlling the thermal environment.

It is recommended that the heating and ventilating systems for each school be designed by competent, consulting (non-agent) licensed engineers. The design should strive for simplicity and economy of operation along with adequacy. The type of system adopted should be determined by engineering study, which takes into account the size and type of school and its arrangement on the site, and local climatic conditions (temperature extremes, exposure to prevailing winds, etc.) Heat loss from the building through exfiltration within the range of outside temperatures must be calculated along with the temperatures to be maintained in the various kinds of spaces in the building in order to determine the required capacity of the heating system. Another item to be considered in determining the capacity of the heating system is the likelihood of future expansion of the school plant.

The type of heating system adopted may be any one of the following, depending upon the engineering study referred to above:

1. Direct radiation
2. Unit ventilators

3. Warm air furnace systems

4. Forced air systems

5. Radiant panel system

6. Split system

Automatic control of the heating system is essential. Preferably there should be individual room control. In school plants having facilities which may be used during non-school hours, the heating system should be so zoned that only the spaces to be thus used need to be heated.

The heating system should provide controlled room air temperatures as follows:

a. Instructional spaces of sedentary to moderate activity 68° -72°
b. In corridors and spaces of moderate activity ---------- 66° -70°
c. In spaces of vigorous activity ----------------------- 60° -70°

The type of ventilating system adopted must, of course, be consistent with the type of heating system used. Within the latitudes and climatic conditions of Utah a mechanical system may be considered necessary. The amount of outdoor air which should be supplied may vary according to the type of space.

It is recommended that in regular classrooms and libraries, the supply of outside air should range from 10 to 15 cubic feet per minute per pupil, depending upon outside temperatures or about three changes per hour. Many other spaces in the school buildings have special ventilating problems. For example, auditoriums or other rooms in which large groups assemble (50 or more) mechanical ventilation should provide not less than eight air changes per hour. Toilet rooms, kitchens, or other rooms producing odors should be provided with positive ventilation through independent exhaust ducts. (For such spaces the rate of air change may desirably be increased to as many as twelve changes per hour.) Wardrobe spaces or facilities, especially if located within classrooms, should be provided with ventilation through grills to exhaust ducts.

When outside temperatures reach the desired room temperatures as listed above, it will be necessary to have the ventilating system designed for cooling. With the programs of extended school year and increased summer activity, it may become necessary to include cooling in all school plans. Comfortable thermal environment may be achieved by controlling temperature and air movement. The rate of air movement during the heating season in instructional spaces generally should not be greater than about 25 lineal feet per minute. When cooling is desired, the rate of air movement may be increased to as much as 100 lineal feet per minute. Recirculation of air, particularly during warmup periods, is permissible, provided the amount of air change outlined above is assured.

The proper insulation of school buildings is an important factor in the control of the thermal environment of school buildings. It is of critical importance as well, both in the control of solar heat gain and in the prevention of excessive heat loss. Insulating materials serve as well to control troublesome condensation. Engineering study should determine the type and extent of needed insulation for the type of building and the local climatic conditions.

E. Auditory Environment

Hearing ease is critically important to the efficiency of the learning process. The control of noise is not difficult. It may be accomplished in part by space organization and in part by acoustical treatment. Of course, the first step in noise control may be taken when the school site is selected. Noises of rail or highway traffic and noises of industry may be controlled only by locating school sites to avoid them.

Space organization is a key to noise control. Noisy spaces should be relatively isolated. Outside play areas should be located away from the sides of classrooms through which noise is transmitted.

Within the school building the spaces should be conditioned for sound absorption by acoustical treatment. Certain large spaces, or spaces in which public performances may be carried on (for example, auditoriums, music rooms, and multi-purpose rooms) should be treated according to acoustical engineering studies which may influence structural design as well as acoustical treatment of surfaces. Any fees paid to acoustical engineers are a good investment.

F. Design For Safety

It is assumed that the structural design of school buildings will be in accordance with generally recognized and observed safety factors. It is also assumed that supervision during construction will make sure that specifications are strictly carried out. It is recommended, however, that preliminary to the final structural design, a competent foundation investigation be made by engineers professionally qualified by training and experience to make foundation investigations.

In addition to structural safety, the building should be designed to reduce to a minimum the hazard of accidents to the occupants. One-story buildings are safer than multi-story buildings. They allow faster evacuation and avoid the safety hazards of stairs and ramps. Corridors and passageways should not be dead-ended; their width should be calculated in terms of the maximum traffic load for any part of the school day. Projections into corridors should be avoided.

Main exterior doors used by pupils should be equipped with panic bolts which are maintained in good working order. Projections into spaces used for play or gross physical activity should be avoided (e.g. serving counters from kitchens, heating units, etc.). Separate storage space should be provided for chairs or tables which may at times be used in that space.

If the structural design should include ramps, the pitch should not exceed one foot in eight. The floor finish should be of a material which is slip-resistant. Entryways subject to accumulated moisture should have floor finish which does not become unduly slick when wet (e.g. quarry tile).

G. Planning For Operation and Maintenance

Much can be done on the drawing boards and in the formulation of specifications to simplify and make easier the operation and maintenance of school buildings. To be sure, school buildings are planned primarily for their educational utility--for efficiency in facilitating the educational program. But school buildings must be operated and maintained too, as any operating budget will attest. And ease of operation and maintenance (and hence low long-time cost) can be had without sacrificing utility. Another value besides low operating cost, good housekeeping, should result from planning with an eye to ease of operation and maintenance.

1. Space Organization

   a. Provide adequate space and facilities for the custodial staff--service sinks and storage at convenient locations; work and repair room with suitable benches, tools, equipment and storage, adequate receiving room with convenient, sheltered unloading dock.

   b. Convenient service access for deliveries to the building.

   c. Convenient access to service systems for repair and maintenance.

d. Provide for isolation of spaces to be used during non-school hours.

e. Provide for proper drainage and for walks and surfacing near building entrances to avoid carrying excessive dirt into the building.

f. Avoid as far as feasible enclosing small spaces hard to clean; also non-functional recesses adjacent to fixtures and equipment.

2. Structural Design

a. Avoid intricate surfaces (e.g. eggcrate louvers) hard to clean and paint.

b. If pipe tunnels are included, make them easy to travel in and provide occasional electric outlets. Make service systems easily accessible.

c. Keep floors of toilet rooms free--e.g. wall-suspended water closets, ceiling hung stalls.

d. Keep exterior surfaces which require painting at a minimum.

e. Insofar as possible, plan the glazing design in terms of uniform sized elements.

f. Provide interior down spouts for roof drainage with proper sumps.

g. Provide for convenient, sanitary refuse disposal.

3. Materials

a. Use flooring or floor finish materials suited to the activities to be carried on, but durable and easy to keep clean--e.g. grease and moisture resistant in kitchen's dining areas, impervious finish in toilet rooms; molded durable base to with stand impace and avoid sharp angles hard to clean.

b. Provide durable, easily cleaned surfaces on walls subject to impact--e.g., glazed structural tile or smooth-face brick which will require infrequent re-sealing.

c. Specify stainless steel, or at least structural tile sight blinds in toilet rooms.

d. Provide floor-to-ceiling glazed surfaces on exposed walls in kitchens and toilet rooms; also moisture resistant ceiling surfaces.

e. Specify metal exterior doors; aluminum window sash.

4. Mechanical and Service Systems

a. Make certain that these systems are adequate in capacity and performance; or durable materials and simple to operate; and installed so replacement is relatively easy.

b. Specify vitreous china fixtures--water closets, drinking fountains, lavatories, urinals.

c. Make sure that electric circuits in kitchens are suited to the equipment to be installed, or which may be installed in the future.

d. Provide sewage disposal pipes from kitchens resistant to cleaning chemicals.

e. Provide floor drains in all spaces where floor cleaning can best be done by flushing.

E. Sanitary and Plumbing Facilities

The National Council on Schoolhouse Construction recommends for a school a supply of safe and palatable water of at least 25 gallons per pupil per day for all purposes. In rural localities where the water mains are either not adequate or unavailable at the school site for firefighting, provision should be made of special storage facilities on the site for this purpose. The Utah State Department of Health, Division of Sanitary Engineering, should be consulted on matters regarding water supply for schools.

It is recommended that the educational specifications for elementary schools include provision of sinks with hot and cold water in all classrooms to allow the use of paint, paste, etc. in making charts, posters, and displays. Tempered water should be supplied to all lavatories wherever located. The tempering may be done by installing mixing valves on the lavatories.

__Toilet Rooms__. Toilet rooms should be located at convenient places in the school building to minimize traffic. It is desirable to provide toilet rooms in the general space organization of the school so that children of primary grade age and children of upper grades have separate facilities. Making the classrooms "self-contained" with respect to toilet facilities has proved to be desirable for the younger grade groups. It is desirable to locate toilet facilities for convenient access from outside play areas. The toilet rooms should be large enough to accommodate the required number of fixtures for convenient use. A minimum width of ten feet is considered necessary with an additional 30 inches beyond the wall back of the main fixtures for plumbing and service. Natural light is desirable. Entrances should be provided with sight blinds.

The floors of toilet rooms should be of an impervious material to allow easy cleaning and the non-retention of odors. Walls should have a glazed finish. Floor drains and hose bibs should be provided.

Ventilation in toilet rooms should be positive and mechanical with separate exhaust ducts. Stall partitions should be substantial and firmly anchored. If metal, the finish should be of good quality baked enamel. Ceiling suspension, properly designed, to ease cleaning of floors is desirable. Marble stall partitions, firmly anchored, are satisfactory. Soap dispensers, toilet paper holders, and hand drying facilities should be chosen in terms of convenience, durability, and operation cost. Mirrors should be installed on walls apart from the lavatories. In girls' toilet rooms at least one full-length mirror should be provided.

Fixtures. It is recommended that the number of fixtures should at least equal the ratios given below which coincide with the recommendations of the National Council on Schoolhouse Construction. In applying these ratios consideration must be given to their location with respect to the numbers of students in the respective parts of the school plant who will be using them.

a. Water Closets - one water closet to each 25 girls; one water closet to each 50 boys. Wall mounting is desirable. For kindergarten and primary grades the fixtures should have a ten-inch rim height.

b. Urinals - one urinal for each 30 boys.

c. Lavatories - one lavatory for each 50 pupils, mounted 25 inches from the floor. Tempered water through one spigot. Stoppers in the basins are not necessary.

d. Drinking Fountains - one drinking fountain for each 75 pupils. If installed in corridors it is desirable to provide full recess for the fixtures (this included cooling facility where used). Frost proof fountains should be installed in outdoor play areas. Drinking fountains should not be attached to sinks nor located in toilet rooms. The nozzle should be of a type to prevent contact with the mouth and not to allow water to fall back onto it from the lips. Recommended heights of drinking fountains are 24 inches for kindergarten and primary and 28 inches for upper elementary schools.

e. Sewage Disposal - The plans and specifications for sewage disposal facilities should take into consideration possible future expansion of the plant. In cases where sewage disposal must be provided independent of satisfactory municipal systems it is necessary that the Utah State Department of Health, Division of Sanitary Engineering, be consulted. Grease traps should be provided in kitchen drains.

f. Miscellaneous - Long-range economy calls for the installation of piping sized to serve any future expansion of the plant. The pipe should be non-corrosive in terms of local soil conditions. Valves and fittings should be of high quality and tagged for identification. The custodian should have a chart of the plumbing system. Hose bibs outside of the building should be designed for convenient use in landscaping care.

I. Decoration

One of the basic educational needs of children is to have beauty in their lives. The child's ability to see and appreciate beauty is nurtured by his surroundings. Since the child spends a major portion of his time in the schoolhouse, should not the school contribute to his understanding of beauty? Why not have the school be the place where he meets this need. Here he can be taught to understand and appreciate it.

This beauty need not be expensive. It can be accomplished by relating the school building to its natural surroundings by proper use of materials and exploitation of their textural relationships. It can be accomplished by proper attention to such things as space, buildings, masses, proportion, color, and lighting. A good school plant should be one that attracts beauty in and of itself, and because of this, transmits beauty into the lives of the children who attend it.

The aim should be to integrate art and beauty throughout the building, rather than including it reluctantly in isolated areas. Color is the most versatile and economical means of integrating beauty into a structure. In too many cases, bare empty spaces in school buildings cry for the aesthetic tough of the painter or sculptor. By the use of color, painters and sculptors attract and involve the observers and integrate them into the building. We should, then, in our buildings, seek the type of beauty that excites the emotions and the imaginations of the students and challenges them to activity and exploitation of their abilities.

Much attention to minor details such as floor finishes, furniture, and equipment, woodwork, chalk and tackboards, pictures, and color schemes all should be incorporated into the total aesthetic appeal of the school plant.

Chapter V

SPECIFIC SPACES - FURNITURE AND EQUIPMENT

A. Instructional Areas

The desired sizes of instructional areas and major items of furniture and equipment are presented here under the philosophy that instructional areas are flexible and adaptable to various instructional situations. But, it should be understood that the application of this philosophy in any given instance may be modified. For example, there may be such special-instruction spaces as a music room, library, or crafts room.

The size of the areas as stated include the sum of the spaces for storage, casework, toilet rooms, cloak facilities, etc. which open into the instructional areas.

1. Activities.

Types of activities and implications for facilities were given general mention in Chapter I, above. Following is a more detailed, but not exhaustive, listing of the activities commonly carried on in the modern elementary school. The activities are named without specific reference to grades or maturation level in order to avoid needless repetition. But the suggestion is made to the planning team that the educational specifications should be drawn up to include a detailed and specific description of the activities of each age level.

a. Using books and printed materials to acquire reading skill, to gain information, for enjoyment.

b. Planning activities.

c. Holding group discussions.

d. Giving oral reports, telling about things.

e. Working with committees.

f. Making charts, maps, booklets.

g. Writing reports, letters, stories, poems, notices, articles.

h. Collecting and exhibiting specimens, and displaying projects and examples of the results of group and individual work.

i. Experimenting with natural objects, scientific equipment and materials.

j. Painting and drawing.

k. Dramatizing stories and creating plays.

l. Making tape recordings.

m. Participating in physical education activities--playing games (organized and free), dancing.

n. Participating in music activities--listening, playing instruments, singing, responding rhythmically.

o. Practicing good health habits.

p. Eating.

q. Resting.

r. Constructing things with blocks, clay, paper, wood, metal, and making models.

s. Caring for pets and plants.

t. Sewing and weaving.

u. Using audio-visual aids equipment.

2. Furniture and Equipment.

Furniture and equipment should be considered by the planning team in the preparation of the educational specifications from the standpoints of (a) the organization or layout of the various spaces, and (b) the kinds and quantities of the various items.

Organization of the items of furniture and equipment within a space is, of course, dependent upon the kinds and numbers of the various items as well as upon the educational philosophy being practiced. Herein it is assumed that the educational philosophy set forth in this planning guide is the one that is to be practiced, and that it will be the decision to provide the facilities to carry on an educational program which will involve the activities named above.

The instructional areas, therefore, should be organized into various interest centers or activity areas such as:

a. Area equipped with movable, individual, flat-topped working surfaces, and separate chairs easily adjusted to accommodate different groups. This area may quickly be cleared and rearranged for many different activities--for example: indoor games, rhythmics, play with toys, resting on mats on the floor.

b. Reading-library area equipped with one or more tables and conveniently located storage facilities.

c. Science area, desirably located under windows and equipped with a good moisture resistant working surface, sink, electric outlets, convenient storage for specimens, scientific equipment and supplies, aquarium, terrarium, pet cages, etc.

d. Construction center equipped with work bench and related tools, sink with hot and cold water mixing faucet, table and chairs for working with media such as clay.

e. Space for a piano, record player, television set, tape recorder.

f. Space for development of long-term projects.

g. Teacher center equipped with desk, chair, files, etc.

For the sake of achieving maximum utility of the space, it is recommended that pupil furniture be movable, stackable or storable (chairs separate from working surface furniture), durable, comfortable, attractive; and that it be provided in a range of sizes in each area.

One practice which has been found satisfactory, but which has not yet become general, is calculated to give the teacher greater flexibility in the organization of educational activities within the area. It is the practice of providing furniture in such a way that a piece of furniture is not identified with a particular child. Thus, the furniture may be moved and rearranged for various activities without the possibility of a pupil being concerned about what is happening to his "desk." Of course, under this practice it is necessary for the casework in the room to be designed so that each pupil may have his own cubicle for personal items.

A further advantage is claimed from this practice. Not only is greater flexibility, and therefore increased utility, achieved for the operation of the educational program, but the physical needs of growing boys and girls are also better served. It is difficult, if not impossible, to provide the proper ratio of dimensions--floor to seat and seat to working surface with ample knee room and with working surface of proper elevation--when the book and belongings receptacle is placed between the seat and working surface. The location of the receptacle at any other point does violence to the criteria of movability and storability (or stackability).

With respect to general-use furniture and other items of equipment, including casework, it is recommended, and this again for the sake of maximum flexibility, that the items specified should be both modular and movable insofar as it is feasible.

As in the case of the list of activities cited above, the following list of kinds and items of equipment is given without reference to a particular teaching area or interest center. The list is not exhaustive. Those who prepare the educational specifications must, of course, be quite specific with respect to descriptions of the kind, type, and quantity of the various specific items for each area.

a. Large movable tables
b. Small tables
c. Display cases
d. Acquariums
e. Terrariums
f. Pet and bird cages and houses
g. Work benches with related tools
h. Clay bins
i. Bulletin and peg boards
j. Chalkboard
k. Easels
l. File cabinets
m. Cabinets for charts, posters, etc.
n. Cabinet of shallow drawers for storage of large size paper.
o. Projectors and screens.
p. Piano, record player, television set, tape recorder (plenty of electrical outlets, well-placed)
q. Musical instruments - rythm instruments
r. Toys, equipment for various games (indoor and outdoor)
s. Maps, globes, etc.
t. Pictures.
u. Carefully designed storage facilities.
v. One or more mirrors, placed near floor level.
w. Sink.
x. Drinking fountain.
y. Lavatory.
z. Water closets (for at least kindergarten and first grade rooms)

3. Storage

There is such a thing as having instructional areas over-designed with respect to casework. It is suggested that the same meticulous care should be taken in the educational specifications with respect to storage facilities that characterizes the reaching of decisions on other parts of the school plant. Use and need should be the abeis of the specifications for every part of the casework.

a. Cabinets for general supplies
b. Shelves for books
c. Cabinets for charts, posters, etc.
d. Cabinet of shallow drawers for paper - enough drawers so that one color or another size need not be placed on top of another
e. Shelves for toys
f. Shelves (cubicles) for sleeping and rest mats for kindergarten and first grade rooms
g. Cubicles for materials and belongings of individual pupils
h. Shelves and cabinets for tools, materials, paints
i. Cupboard with lock for teacher's wraps, hat, purse, books, etc.
j. Storage for pupils' wraps and boots--within the area for kindergarten and first grade, but screened off from the rest of the area. Above the first grade the cloak storage need not be within the area, but if so then the storage facilities in the corridor are satisfactory.

4. Instructional Area.

The recommended sizes of the instructional areas are stated as desirable minimums. All sizes, as given, include casework or other storage areas and toilet spaces which open directly into the instructional area. They apply to the maximum number of students to use the area at one time for instructional purposes.

a. Kindergarten, 40 to 50 square feet per child

b. First grade, 35 to 40 square feet per child

c. Second grade, 30 to 35 square feet per child

d. Grades above second grade, 25 to 30 square feet per child

This may be a good point at which attention should be called to the serious and widespread error of assuming an abrupt and precipitous jump in maturation of children between kindergarten and the first grade. It is here recommended that first grade rooms should represent a transition in its equipment and organization.

5. Chalkboard and Tackboard.

Those preparing the educational specifications should think well before deciding how much chalkboard to specify for each instructional area. The modern trend is to replace much of the traditional area of chalkboard with tackboard. It is important in the specification of both chalkboard and tackboard to insist upon a reflection factor which will keep the brightness differences within recommended limits.

The following criteria[6] have been named for judging chalkboard: (1) sufficiently abrasive to take chalk well, (2) smooth enough and sufficiently impermeable to clean well, (3) heavy and rigid enough and mounted with sufficient backing to eliminate vibration and resonance, (4) properly colored for effective contrast with chalk and minimum brightness contrast with the remaining visual environment. It has been found to be satisfactory to have at least some of the chalkboard made out of a steel base coated with a green porcelain which allows the use of magnetized indicators. The practice of placing a strip of tackboard above the chalkboard is questioned. A better device is to place a very narrow strip of cork in a metal channel just under the slot designed to support the movable hooks used for maps, charts, etc.

6. Visual-Aids Facilities.

Philosophy and practice vary with respect to the degree to which projection of visual images is used as an aid to instruction. The position is here endorsed that maximum returns can be had when the projection is made within the instructional area and as a part of the regular arrangement of the learning activities.

Much research has been done and is still going forward to develop the means for satisfactory daylight projection. Devices are now available which are reasonably satisfactory for the projection of slides and film strips in areas which meet the requirements for comfortable seeing as described in Chapter IV. Opaque projection up to now requires area darkening.

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[6] Herrick, et al, From School Program To School Plant. Henry Holt and Company, New York, 1956, p. 271.

It is suggested that careful study be made by the members of the planning team of the most recent developments specifying the controls for facilitating the use of visual aids.

B. Special Instruction Spaces

Practice varies with respect to the provision of rooms for group instruction in special areas--such as: arts and crafts, music, homemaking, physical education. In the exceptional cases where the elementary school includes grades 7 and 8, an approach should be made to provide facilities for such areas of the educational program which are common to junior high schools.

1. Instrumental Music Facilities.

A large part of the music activities can and should be carried on within the instructional area. However, instrumental music activities are best when a special space and related facilities are provided. The facilities for instrumental music should include a room of substantial size, properly designed with respect to acoustics, and designed, either by location or sound barriers or both, to protect the auditory environment of the other spaces in the school. There should be convenient and secure storage for instruments. The teacher center may be in an office in which special casework is provided for sheet music and instructional materials. Small practice rooms are considered to be unnecessary in the elementary school program.

When the school plant includes an auditorium, the music room may with some advantage be located for convenient access between them. Experience generally has been disappointing in cases where the stage or platform of the auditorium or multipurpose room have been designed for use as a music facility. In such cases conflicts in use schedule are common, awkwardness is experienced in space organization to provide needed storage, and most importantly, it is hard to provide a movable barrier with sufficient sound drop to prevent the noise of the instruments from interfering with the activities in the body of the main space.

The music room should be equipped with a piano, record player, radio television set, tape recorder, timing bar, metronome, etc. The design of the room should allow the use of projection devices. Special consideration should be given to the problem of ventilation. One section of the chalkboard should be permanently lined with staff lines. There should be ample tackboard in the room.

2. Arts and Crafts Facilities.

Unless the school includes grades seven and eight there should normally be no need for providing special facilities for arts and crafts. If these upper grades are included, then an attempt should be made to add the activities to the program. For grades below the seventh the arts and crafts activities are such that they may be carried on quite satisfactorily in the instructional area.

3. Homemaking Facilities.

What was said above with respect to arts and crafts facilities applies also to activities in homemaking.

4. Physical Education Facilities.

The program of physical education in the elementary school is such that some indoor space is necessary. The term "gymnasium" is deliberately avoided to designate the desirable facilities, inasmuch as this particular word has been so long associated with the type of program carried on in secondary schools. Of course, if the elementary school includes seventh and eighth grades, then it is desirable to provide indoor facilities which allow the activities of some of the junior high school program (basketball, for example). Also, if the facilities must meet the needs of the community for adult recreational activities, then too the facilities must be designed accordingly. But in the latter case it is imperative that the needs of the elementary school program shall be first served and left unimparied.

In the elementary program a greater emphasis is placed upon play and recreational activities. The types of physical skills to be developed by the physical education program of the elementary school are those which involve running, jumping, catching, throwing and batting a ball, stunts (including tumbling), dancing, etc. For the maturation levels represented, the skills are probably as difficult to acquire as are the more complicated skills involved in the program for older pupils. The important elements of sportsmanship and cooperation have their important beginnings in the elementary school program. The skills are developmental aims of the program and cannot be left to chance. The planning of the facilities to implement the program is an important task.

The indoor space needed for play and physical activity for this type of an elementary program for a school of 400 desirably should be about 40 x 60 feet. For a larger school the arithmetic of use should be calculated. One solution to larger facilities may be to enlarge the overall space within the room and install a motorized partition with a satisfactory sound drop in order to provide two teacher stations.

The ceiling height of the space to be used only for the elementary school program should be a minimum of 18 feet. The floor should be resilient and light in color. It is desirable to include specifications for plates in the floor for anchoring net standards for various games. The walls, at least to a six foot wainscot height, should be smooth and resistant to impact. If natural light is used as a major light source, the design should protect against interference by glare in the game activities in the space.

5. The Auditorium.

The auditorium may be used for group instruction in communications. So used, it may be thought of as a special instruction space. To the extent to which the facility is used only for performances, the auditorium perhaps should be considered as a general-use space. But surely nothing is to be gained by laboring a distinction. The fact is that in its design the performer-audience relationship is dominant.

There are at least two major advantages in having an auditorium designed as such--one which need not be used for activities other than communicative activities (assembly, speech, drama, musical performance, etc.). These are:

a. The space may be designed for the performer-audience relationship. For example, a sloping floor greatly facilitates full vision of the performers by the audience.

b. The potential conflict in use is avoided when the facility is specialized as an auditorium.

The acoustic treatment of the auditorium is of sufficient importance that the services of an acoustical engineer are justified. Also, special consideration should be given to the design of the ventilation system.

The auditorium should be so designed that projection of films and other visual aids is possible.

The platform, together with the platform risers to it, should desirably be large enough for the massing of large groups of performers. There is no need for dressing rooms to be used by the elementary school program. Access to the platform should be convenient from nearby classrooms which may be used for makeup and costuming. Performers should gain access to the platform without traversing space in view of the audience. If the auditorium of the elementary school must also serve community uses, then the platform facilities must be designed accordingly, and those preparing the educational specifications should refer to other sources.

The curtain system and tracks need not be elaborate for the elementary school auditorium platform. Relatively simple and quite satisfactory materials and facilities are available. The same is true for lighting systems. Experience has shown the advantage of not including the curtain facilities in the contract. There is economy in the practice of requesting several dealers to examine the plans and specifications for the project and to submit their own recommendations (plans and specifications) along with firm figures on costs. Thus, the dealers are in competition to devise the most satisfactory as well as the most economical plans for the curtain system.

Some storage should be provided for a minimal amount of props. Also, it is desirable to provide separate protective storage for piano. The piano should not have to be moved over a sill or should it have to change floor level to be moved into and out of storage.

Seating for the auditorium should be upholstered and of good quality.

The floor covering should allow the quiet movement of the audience to and from the seats, which should be fixed in installation.

6. Library.

As in the case of the auditorium, the elementary school library may be both a special instruction and a general-use facility. Group instruction in library activities within the library is common when such a facility is included in the school. Children also use the library as individuals on their own initiative and on assignment.

There is a trend away from a library as such to an instructional materials center--a facility which provides storage for a wide range of instructional aids and devices, and allows convenient and ready access to them. The learning activities take place in the classrooms rather than in the instructional materials center.

The library must have enough space (a reading area sufficient to accommodate a normal size class group) and must be equipped with suitable furniture for the various activities of pupils and teachers in addition to adequate storage facilities. The library should be designed to achieve a pleasant, attractive, quiet environment. Special attention must be given to the design of the visual environment. Display cases and bulletin boards should be adequate. Open book shelves should place books within easy reach of children. An accession-work room with access to a corridor as well as to the library should be provided for the librarian. This room should have a sink with hot and cold water and good working surface. Also, there should be shelves for books and materials being processed as well as cabinets for working materials. A space for a desk and files should also be provided within the library room.

The library should not only serve as a library, but should function as an instructional materials center, also. Whereas the instructional materials center may be designed to be used for the control, storage, and management of supplementary instructional materials and aids of all kinds. The instructional materials center concept is in harmony with the philosophy of self-contained classroom. There may be some capital outlay savings in providing such facilities rather than a library.

C. Administrative Spaces

The administrative suite is a focal point in the school plant. Its location should provide easy access to those who come to it from within the school as well as to those who come from the community. The functions or activities for which the administrative suite should be designed to facilitate include the following:

1. Supervising instruction
2. Organizing and planning the instructional program
3. Planning and managing pupil activities
4. Keeping pupil records
5. Personnel management of pupils
6. Conferences with pupils, teachers, public
7. Dealing with health problems--medical examinations, isolation and care of sick or injured pupils pending disposition
8. Filing of correspondence and business records
9. Communications--receipt and distribution of mail, correspondence, use of duplicating equipment, inter-communication within the school plant.
10. Managing the time, alarm, and signal systems
11. Storage of wraps, etc. of administrative and supervisory personnel

12. Control of school supplies and books
13. Storage and management of keys
14. Display

Depending upon the size of the school, the functions or activities listed above call for varying numbers and kinds of separate spaces. In any event several of the activities can most easily be carried on in a single space. The point to be emphasized here is that the educational specifications must be prepared in detail on the basis of all of the activities to be implemented.

For a school approximating the optimum size, a minimal administrative suite should include two major divisions:

1. Offices--a private office for the principal and an outer office which includes a waiting space. A vault for the better protection or records against fire is desirable.
2. Health-isolation space. It is desirable to locate this facility within the administrative suite so that a sick or injured child awaiting disposition may be under the close supervision of the principal.

1. Offices.

The offices should be designed for visual and auditory comfort. It is desirable, though not imperative, for toilet facilities to be included in the administrative suite for use by the administrative personnel. Storage for office supplies and equipment should not be overlooked, nor should facilities for wraps, etc. Although such facilities are frequently located in rooms designed as lounges or rest rooms, casework containing cubicles for the distribution of teachers' mail is sometimes placed in the outer office area.

The controls for the time signal and alarm systems should be located in the outer office area; also for the inter-communication system, if one is included.

2. Health-Isolation Unit.

The health-isolation facility serves the needs of the school nurse, the occasional demand for medical examinations, and the intermittent care of a sick or injured child. It should contain a lavatory and should be equipped with one or more cots. The casework should be designed for the needs of the school nurse and for the first aid supplies. A toilet space containing a water closet and lavatory should be adjacent to the isolation space. It is generally not feasible to combine the facilities for the health-isolation unit with those designed to implement other activities. The uncertainty of the use schedule, especially for isolation, tends to invalidate the multiple use concept in this instance.

D. Service Spaces

1. Supply-Book Storage.

One of the commonest complaints made by the professional staff of a school has to do with lack of or unsuitability of storage facilities. If a design error must be made, it probably should be in the direction of too much rather than too little space for storage. It is economical with respect to space as well as for operation to combine the main supply storage room with a teachers' work room. Such a room, in addition to the storage facilities, should contain a sink with hot and cold water, ample working surfaces, paper racks, duplicating equipment, etc.

2. Conference Space.

Space for conferences of the staff may be provided by designing the size and furniture of the lounge or rest room so that faculty meetings may be accommodated. Folding chairs of good quality may supplement the regular furniture for the needs of the entire group.

Conferences between teachers and individual pupils in a counseling relationship demand privacy and relaxed environment. It is not yet common to staff an elementary school with a professionally trained counselor who is assigned to that function in the school and with facilities designed to serve the needs of such a service. Even if such a program were in existence in the school, there would still be a need for spaces in which teachers may carry on counseling and related activities with individual pupils. The provision of small conference rooms adjacent to the classroom in sufficient number so they may be shared by two or more teachers is a forward step in school plant design.

3. Teachers' Lounge or Rest Rooms.

A quiet, tastefully furnished lounge for teachers is a good investment. The unit should include toilet facilities. A unit kitchen with small refrigerator is desirable. The furniture should allow quiet relaxation and rest. Storage for books, magazines, and writing materials should be provided. Writing surface should be provided on some pieces of furniture.

4. Custodial Spaces.

A well ordered and efficient program of operation and maintenance of the school plant is critically important to the effective operation of the educational program. For this reason and because proper custodial activities constitute the best protection for the capital investment, it is good sense to plan with great care the facilities needed by the custodial staff.

The following functions to be served by the facilities may be identified:

a. Daily and periodic cleaning of floors, windows, and other surfaces.

b. Operating, repairing and servicing the various service systems.

c. Painting and refinishing various surfaces and furniture.

d. Receiving and handling general school supplies and custodial supplies and materials.

e. Control and storage of supplies and materials.

f. Disposal of waste.

g. Keeping records, making requisitions and reports.

h. Changing clothes, showering, washing.

The size and number of specific spaces to be provided and their arrangement should be determined chiefly by the size of the school. No mention is here made as to spaces for the heating and ventilating system, nor of spaces needed to provide access for servicing of any of the service systems. It is assumed that the design will be prepared by competent engineers to satisfy the needs. The facilities needed by the custodians are outlined below:

a. Custodians' workshop and storeroom. This room should be designed to serve the needs of maintenance crews in repairing and servicing the heating, ventilating, electrical, and water service systems as well as the routine repair tasks performed by the custodial staff. It should normally be equipped with heavy duty work bench, heavy duty steel counter, steel shelves, steel racks for lumber and pipes, tool boards, and bins. The usual bench tools should be supplied along with such items as emery wheels and drill press.

b. Receiving and shipping room. This room should be readily accessible to vehicular traffic and should be so located that it is adjacent to the main supply room. It should contain storage for tools used in crating and opening crates as well as for the materials used in shipping.

c. Custodial locker room. This unit should contain lockers and dressing space, toilet facilities, and shower.

d. Storage room for oil, greases and paint. Shelving for paint, oils, and greases should be provided along with floor space for larger drums. The design should contemplate free movement of trucks and dollies. Racks for step ladders should be included.

e. Janitors' closets. Closets with service sinks and shelving and racks for the convenient storage of cleaning supplies and equipment should be provided for the custodial workers throughout the building at locations to minimize walking distances.

f. Custodial office. An office for the custodian should be provided and equipment to facilitate the making and filing of reports, requisitions, records.

g. A storage room opening directly to the outside should be provided for the storage of equipment used in landscaping and snow removal.

h. Miscellaneous custodial facilities. An incinerator should be made readily accessible, but so located as to minimize fire hazard. Meter and switchboard facilities may be located in separate rooms, but attention should be given to making them readily accessible.

5. General Toilet Spaces.

Toilet rooms, other than those in the classrooms or other special units, should be located to minimize circulation and to allow ready access. Types, numbers, and heights of fixtures are described in Chapter IV, above. Toilet rooms should be well lighted, preferably by natural light. There should be adequate mechanical ventilation on independent ducts. Floor and wall finishes should be impervious and resistant to cleaning action.

6. School Food Service Spaces.

The facilities for school food service are fully treated in one of the School Plant Planning Series numbers--Planning School Food Service Facilities. Those engaged in planning elementary schools may refer to this publication for guidance in the preparation of educational specifications.

E. Connecting Spaces

Entrances, foyers, and corridors serve the primary function of circulation--access, movement, and exit. Circulation, of course, is incidental to the activities of the school. Therefore, the amount and organization of connecting space is incidental to the overall organization of space in the school plant. The connecting space is not an end in design. Nevertheless, it is recognized that corridors and other connecting space add to total construction cost and to long-time cost of operation and upkeep. Hence, the design of such space justifies careful consideration.

Having said this much, a further point is raised for serious consideration. Connecting space may be designed to achieve real values beyond the function of circulation only. Mention was made in Chapter I, above, of a trend toward designing schools for aesthetic values and to avoid the appearance and climate of an institution. The character and organization of connecting spaces are major factors in achieving these values. Rectilinear compactness may achieve capital outlay savings, but is does so at the sacrifice of openness, hominess, "child scale," and aesthetics.

Foyers and corridors are excellent locations for display cases, pictures, bulletin boards, etc. The storage facilities for the wraps of children above the first grade may be provided economically in corridors. Corricor walls should be finished with durable material easy to keep clean.

The base should protect the wall against soiling from contact with the equipment used to clean the floors.

The floor of entrances should be finished with material not subject to damange by water and of a character that does not become slick when wet.

F. Outdoor Areas

The problems of organization and development of the site are dealt with in Chapter III, above. Its importance justifies repetition of the concept that the inter-relationship between indoor and outdoor space should be fluid, dynamic, and functional. The organization of indoor and outdoor space must be considered and developed together.

Perhaps this inter-relationship can be seen most clearly in the provision of outdoor classrooms, or again in the use of landscaped courts to open up the overall design of space, or yet again in the use of landscaping to control interior visual environments.

Guidance in the preparation of the educational specifications for the various specific outdoor play and recreation areas can be found in Planning Health and Physical Education Facilities, one of the School Plant Planning Series published by the State Department of Public Instruction.

SELECTED REFERENCES AND SOURCES

An important part of the equipment of the school plant planning team is a carefully selected collection of reference materials. The titles listed below are suggested as examples of such materials. References are not included here which deal specifically with the facilities for which separate brochures are available in the School Plant Planning Series (separately listed below). Such references are cited in the respective brochures.

Sources of School Plant Articles

1. American School Publishing Corporation. The American School and University. (Annual editions since 1928-29.) 470 Fourth Avenue, New York 16, N. Y. (See School Plant Bibliography, pp. 453-472, 1955-56 edition.)

2. American School Publishing Corporation. The School Executive, 470 Fourth Avenue, New York 16, N. Y.

3. Educational Facilities Laboratories, Inc. 477 Madison Avenue, New York 22, New York.

4. School Managment Magazines, Inc. School Management. 22 West Putnam Avenue, Greenwich, Connecticut.

5. School Planning Laboratory. Stanford University, School of Education. Stanford, California.

6. The Bruce Publishing Company. The American School Board Journal. Milwaukee, Wisconsin.

7. The Buttenheim Publishing Corporation. Overview. 470 Park Avenue South, New York 16, New York.

8. The Nation's Schools Publishing Corporation, Inc. The Nation's Schools. Park Avenue, New York 17, N. Y.

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1. Association for Childhood Education. Equipment and Supplies. A list of recommended materials (Bulletin No. 39.) Association for Childhood Education, 1200 15th Street, N. W., Washington 5, D. C. Price $1.25.

2. Caudill, William W. Space for Teaching: An approach to the Design of Elementary Schools for Texas. Bulletin No. 9. Texas Experiment Station, College Station, Texas, 1941.

3. Caudill, William W. Toward Better School Design. F. W. Dodge Corporation, 119 West 40th Street, New York 18, N. Y., 1953. Price $12.50.

4. Educational Facilities Laboratories, Inc. Planning for Schools with Television. Educational Facilities Laboratories Inc., 477 Madison Avenue, New York 22, New York.

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School Plant Planning Series

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2. *Guide for Planning Elementary School Plants*.
3. *Guide for Planning Health and Physical Education Facilities*.
4. *Guide for Planning Homemaking Facilities*.
5. *Guide for Planning Industrial Arts Facilities*.
6. *Guide for Planning Secondary School Plants*.
7. *Guide for Planning School Food Service Facilities*.

8. Guide for Planning Vocational Agriculture and Farm Mechanics Facilities.

9. Planning a Program of School Plant Construction.

10. Planning a School Plant--The Educational Specifications.

11. Planning Facilities for Special Education.

12. School Furniture and Equipment.

APPENDIX

The following intimate description of what happens at school together with implications for facilities obviously could not be included within the format of the main body of this publication. But, it is considered to be so revealing and informative in its own format that it is, nevertheless, appended hereto.

The Day Begins

"I like the look and the feel of this place" says Mrs. Wells, as she drives off the street and down to the spacious parking area of the new school. "There's a phrase I always think of, ---'room to grow.'"

"I feel it too," replies her companion, the kindergarten teacher. "This blessed sense of 'room enough' affects everyone."

The two friends move down the pleasant walk, lawn and shrubs on the one side, building with its windows on the other. Mrs. Wells arrives at her outside classroom door first, unlocks it, and enters the room.

"Only two steps up," she thinks. "Just enough to prevent water from seeping under the door - safe and easy to navigate."

Let us look at a typical day's program and see how the space, the storage facilities and the equipment relate to the educational program.

In The Classroom

Mrs. Wells checks the thermostat blower switch and hangs her [illegible]cket and places her hand bag on the shelf of the teacher's closet.

During the next forty-five minutes she is busy with details of preparation for the day. She takes two charts which had been made several days before from the chart storage cupboard and hangs them on the chart rack. She copies a

Parking area convenient for staff and visitors.

Rambling type building on large site so younger and older children can have separate play areas.

Walks and landscaping arranged not only for utility but also for beauty.

Individual outside door provided for every classroom.

Single story building.

Floor level two steps from the grade.

Temperature and change of air controls in each room.

A closet place where the teacher can keep wraps and other personal belongings.

A centrally located storage-work room conveniently arranged for the wide variety of materials needed by the teachers for a modern school program.

letter onto large chart paper. From the supply and work room she brings an electrical hot plate and a film.

Convenient electrical outlets.

"Good morning, Mrs. Wells," calls Jennie, a six-year-old, as she enters the room. "Mother and Daddy went to Idaho early this morning. I may eat lunch at school today." She shows the teacher a newspaper clipping and brings her paper and a pencil. "Please will you write, 'This is may Aunt Colleen.' She is getting married today! I'll sign my own name."

Provision for handling lunches at school.

"You think of everything," says Mrs. Wells with a smile.

The teacher and child find a place for Jennie's picture and a story on the bulletin board by the door.

Bulletin board suitable for easy pinning.

As Mrs. Wells surveys the bulletin board she thinks of all the living which is represented by such items as: a notice of a lost article, an invitation to sing with another room, a new library schedule, announcement of a play, a notice from the office.

Other children come in. They greet the teacher and hang wraps in the coat closet. Some put the things in their desk or get play equipment before going out to play. Olive comes in with a story she thought of on the way to school. While it is still fresh and vivid she dictates and the teacher types it on the primer typewriter.

Wardrobes located within the classroom having doors with pinning boards on one side and provision for circulating air to dry wet wraps and carry off odors.

Storage for jumping ropes, a variety of playground balls, and other miscellaneous play equipment

As the nine o'clock beginning time draws closer, those who come in begin work on the various activities on the work period.

Primer typewriter and desk convenient for the teacher's use.

The children are ready and able to do this now because earlier in the year they had learned to plan together on the rug when they first came in the morning. Now the children plan for the next day's activities just before they leave in the afternoon.

Rug for each classroom of younger children and sufficient floor space.

As Mrs. Wells looks at the busy scene she reflects upon how much independence the children have learned. She laughs to herself at the implication which the scene might have for some people; that things just happen by leaving children alone. She realizes that she must know the children; they must know and trust her; they must cooperatively work out ways to handle materials and places to store them.

The children's interests must be honored and encouraged. As the days go by, new centers of interest must be set up in the room. Responsibilities for doing routine jobs must be accepted. There is continuous planning and evaluating to be done.

Doorways, storage facilities and other items so arranged that the corners of the room can be available for centers of interest or small group work.

She recalls how the faculty group had searched and were still searching for principles and ways of implementing them in practice. Well, she for one had certainly gained insights from the search. Mrs. Wells is happy this day as she moves among the children; helping this one with a problem, and planning with that one. The children are happy, too. Certainly the physical facilities in

Abundant storage of a variety of types.

the room contribute to this sense of ease in living and achieving. Every part of the entire room seems alive with children who are busy at one work center or another.

Large classrooms.

"Just notice," Mrs. Wells might say to an interested observer, "how fully the entire classroom space is needed for an active work period."

Beyond the Classroom

Two children have taken easels and poster paints out on the grass strip. They are putting onto paper some of the impressions inspired by the autumn-colored hills. They are enjoying comparative privacy in the out-of-doors, yet are in view of the classroom.

Easels, storage for poster paints.

Extension of the classroom screened with shrubbery for privacy; this is to include gardening area.

The workbench, too, is outside on the concrete strip. The tool rack is near the door so it will be convenient for both inside and outside work. The children work outside when the weather permits. This use of tools outside can release tensions of the children using them, yet not add to the confusion of others doing different types of work.

Hard surface adjacent to outside classroom door. Sufficient width to permit work and play activities without damage to lawns.

Tool rack on heavy-duty castors or wheels for easy moving. Space and hooks for orderly and accessible tool storage of nails, screws, etc.

Still another committee is outside. The members are digging in the planting area, preparing the soil for planting bulbs. The tools are child-size but of workman quality and include a fork, shovel and rake.

Child-size digging tools and convenient storage for them.

The corridor on the opposite side of the room also serves as an extension of classroom space. This, however, is not the best arrangement. Here play

Corridors may not be best provision for space.

practice is going on. The children have set up screens to block off an end to the hall. This group plans to come into the room when practice is finished and resume work on costumes and properties for the play which will be given in the afternoon.	Portable folding screens and storage for them. Storage for costumes and stage props.
In the corridor just outside the classroom door three children have spread large blocks out on the floor in a series of pens and cages, and the wooden zoo animals are being placed in their respective cages. Conversation about the wooden family which is visiting the zoo is absorbing.	Building blocks and portable storage for them.
Another group of five children goes with the teacher to the small darkroom. They will view the film "Safety" to see if it gives pointers on bicycle safety. The children may help the teacher decide whether or not the film is of sufficient value to be viewed by the whole room in the darkened classroom. The day before this committee had made arrangements with James, an older boy, to run the projector. James will show the film through twice if the children see a need. The teacher leaves when the group is settled.	Additional room available for small group work including darkening shades and film projection facilities. Darkening shades, screen in classroom Projectors, motion pictures, slide film strip and opaque, to be stored in audiovisual room and checked out by librarian.

Within the Room - Interest Centers

At the science center a child is putting geranium cuttings in a "Starting pot" which holds vermiculite. Another child is planting cuttings of wandering-jew. Some plants will be rotted in vermiculite and some in water. Potting soil is available in a covered pail, trowels are in the tool-rack, and various	Counter for display and work space, so surfaced that it cannot be damaged by science activities. Sink and running water in the classroom.

sized flower pots are in a cupboard.	Storage suitable for flower pots.
Also, in the science corner are the aquarium, terrariam and hamster cages. Two children who are responsible this week for the aquarium carefully pour chlorine-free water into the aquarium. They measure the water as they add it, then write the amount and the date on a near-by chart. Then they feed the fish.	Display and storage for aquaria, terraria and pet cages.
Fresh sawdust is being placed in the hamster cages. When the furry family is settled back in the clean quarters, it is supplied with fresh food and water. The three baby hamsters, one by one, are weighed on the postal scales and their gains recorded.	Variety of scales and measuring devices.
In the glass and wire terrarium live a garter snake, a lizard, a horned lizard and a turtle. They live at peace in their miniature desert. Most of the children pay a visit to the science corner during the first part of the morning.	
The playhouse corner is a sewing room on this day. Two girls are creating party dresses for the doll-house family. They find exciting materials in the boxes of cloth pieces. The "Father," who is constructing a garage for the doll house, is frequently consulted as to styles and colors.	Table and chairs--child-size. Doll house with furniture, dolls, etc.
In the library corner several children sit at the round table engrossed in books. Some children read the words and others read the pictures; some read alone and others share with friends.	Library table and chairs, book shelves of convenient height, magazine and book racks.

Other Uses of the Classroom

At the front of the room two youngsters have drawn chairs up close to the record player. They are selecting records for rhythm time. They play with volume turned down.

Record player available on call, mounted on table with casters for easy movement from one place to another.

The electric plate has been set on the long counter near another electric outlet and close to the sink. At this work center a committee is proceeding with much independence to make finger paint. Directions for making it are printed on a large chart hung over the workcounter. The "Safety in Using Electrical Equipment" chart hangs nearby. Last week Mrs. Wells had twice demonstrated to the entire group how to make finger paint. The first time she did it herself. The second time a "demonstration team" was used. The safety chart was developed in connection with this activity.

Pin boards arranged over work counter.

Two boys are drawing at the chalkboard. Their picture of space ships on the moon is really satisfying to them. The teacher enjoys it, too, and the three decide this idea is so good that a permanent picture is to be made. A piece of paper is laid on three desks which have been drawn together, and the big production is begun. The paper is 23 x 36 inches in size.

____feet of chalkboard placed at a convenient level for the children.

Individual and paired single desks which are movable, from which chairs can be detached for separate use and which can be grouped to form table top or scattered. Maximum flexibility is desired.

A double desk is a sewing center for the day. Two girls are making pin cushions, to be stuffed with sawdust. They had found suitable, sturdy cloth in the cloth box the day before and had measured and cut it out and

Storage space.

taken it home for machine-stitching.

Other children are drawing at single desks.

The floor, warm in winter, is also used as work space; three children are stretched out on the rug playing the Cinderella game.

Floor should be covered and so Heated as to make it conveniently possible for children to sit or even lie down on it for activities.

At the other end of the rug two boys sit cross-legged with magazines spread about them. They are selecting and cutting out pictures for their scrapbooks.

Space for wool rug 12 x 15 for every group of children.

"I hope we're working as well tomorrow," thinks Mrs. Wells. "Our visitor will then see the classroom-and beyond facilities in full use. He will see for himself how a well planned and adequate school building makes possible a thousand varied and valuable activities. He will see the Freedom - Responsibility team at work; he will see how children are free, within bounds, to choose what they shall do and are disciplined by the job itself and the standards they have helped set up in a democratic way. He will see a wide range of social interaction; some highly individualistic, some with groups of few and many, and the whole group united on common problems and interests. I wish all our neighbors and patrons and taxpayers could see this for themselves and realize how much these youngsters are learning."

Plenty of storage space for many kinds of materials.

Large wall-type electric clock synchronized by a master clock available in every classroom.

At a signal from one child whose duty is timing for the day, the children look up at the electric clock. The time is 9:50. The cardboard clock face is set at 10:00, the time decided on for clean-up to be completed. The ten minute lee-way has been settled upon by experimentation and evaluation over a period of weeks. The children have found that people painting at easels, those at the workbench and those playing with the big blocks had better begin cleaning up at once. There will probably be time to finish the record on the turntable and to have one more turn around at the Cinderella game.

The decision to decentralize the placement of dust-pans, hand brushes and waste baskets has proven to be a wise one. The set near the outside door is used to clean up around the workbench and the science center. The set by the sink is shared by the pin-cushion makers, paper-cutters, and play producers. Sponges and soap are near the sink where it is convenient to use them.

Two dust pans, two hand brushes, one large broom and two waste baskets together with storage facilities available in every room.

Storage for cleaning powder, sponges, soap and cloth near the sink.

"I can see you'd like to go on for an hour more with this space-ship picture," Mrs. Wells says sympathetically to the boys whose annoyance at interruption shows plainly. Her understanding helps give them stamina to roll up the unfinished picture and store in away until the next day. "The easel is spotlessly clean," and "How thoroughly you have swept up every bit of sawdust," and "These blocks are piled up very neatly--and so quietly, too," are comments which set the general tone of approval and appreciation.

Deep pigeon hole storage for five or six rolls of wrapping paper six inches in diameter and 36 inches deep.

Chairs separate from desks as described above.

As the children finish cleaning up and putting things away they come to the rug. Some sit crosslegged on the rug and some bring chairs and make a semi-circle around it. Those arriving first begin a lively game of "Guess What I Am." Those who finish more slowly receive a lift from teacher or pal or quietly join the group as a job is completed.

Organization for the reporting and evaluation which follows work time has been proceeding all morning. A name or a word jotted down on the chalkboard indicates something is to be shown, some news is to be shared, or some problem is to be discussed with the entire group. If there is more business than the time or the "sitting powers" of seven-year-olds allow, consideration of business on the list can be continued at other times of the day.

Discussion this morning centers about the group's plans for Officer Tom's visit on the next day. The teacher is seated on a low chair in front of the group. The children remain seated cross-legged on the rug or on the chairs circled closely about the rug. If one wearies of his position he may shift to a chair or to the rug with a minimum of disturbance. Each child is within easy reading distance of the large charts. Each can hear his fellows and be heard by them. It is quick, convenient and quiet for a child to leave his seat and step up to the front as needed.

Two large chart holders are in front, one with the stories that have already been written, one holding chart paper, lined but not written upon.

Chart holders to hold charts varying in size from 12" by 18" to 24" by 36", hung either the long or short way of the paper, with loose leaf features permitting a given chart to be exposed for reading or turned over the top and out of the way at the back.

First, Officer Tom's letter of reply is read. When his typewritten letter had come the day before Mrs. Wells had read it to the children and then posted it on the bulletin board. She, however, has made a copy on the large chart paper in heavy black manuscript writing. This teacher looks for every opportunity to extend her children's experiences in reading with meaning. She hopes, too, that by reading this letter again the children will take some initiative in planning to make Officer Tom's visit pleasant and worthwhile.

Various sizes of chart paper:
12" x 18", 18" x 24", 24" x 36"
pre-ruled to permit easy manuscript writing by the teacher.

The letter is read; it says:

"Dear Children,

I will be glad to talk with you about bicycle safety. I will come as soon as I can Thursday morning. This will be around 9:30."

The children comment and make suggestions.

Three days before, Michael and his bicycle had been tipped over in an encounter with another boy on his bicycle. In discussing the incident the children and Mrs. Wells had raised several questions as to bicycle regulations and etiquette. Some of the questions could not be satisfactorily answered by the group. It had been decided that the police officer in charge of school safety would know the answers.

From past pleasant experiences the class judged he would probably come to school and give them a great deal of information and help. So a letter had been composed by the group. Mrs. Wells had typed it, and a committee of the children who lived nearest Mr. Tom had seen that it was delivered directly to his home.

Primer typewriter and pleasant place to use it, available to teachers somewhere in school building.

"It will get there at least a day sooner," they said.

"Besided, we will save the school five cents."

Copies of the story "Michael's Close Shave," and of the letter sent to Mr. Tom had been duplicated and sent home. At least four purposes were thereby served: The home was informed on the school program; it gave parents an opportunity to extend and enhance their child's learnings on important safety and community concepts; the chances for consistent follow-through were increased; practice in functional reading was provided.

Duplicator available in the school.

The planning period continues and the teacher writes questions on a chart. Later she says, "Will you be thinking about other problems which Officer Tom can help us with? Shall we finish writing them before we go home this afternoon?"

Health Activities

"Now let's get ready to stretch out and rest before we go outdoors to play. First, we had better make sure that all who have not been to the toilet since school began go now. Some of you will want a drink, too. Some prefer to drink just before they go outdoors. There is room for twelve to rest on the

Toilet and lavatory facilities available between each two classrooms.
Drinking fountain attachment in every classroom.

rug. The others will get their mats." When most of the youngsters are settled quietly the teacher says, "Jan and John selected two records this morning that they say will be just the thing for the rest music."

When all have rested for about fifteen minutes, Mrs. Wells begins signaling a few at a time to get their wraps. They are all assembled on the rug when she says, "We are going to play 'Old Mother Witch'. Who will be responsible for bringing the lines to mark the boundaries? Good, Ellen and Mark. You had better stand by the door so the line will be in place when everybody is on the southwest corner of the asphalt. Then, I'm going to show you a new game. It's called a relay race. We will need six Indian clubs. We will need some helpers to carry them out and bring them back. Can you figure how many we will need? One helper carried two Indian clubs."

"After we play Old Mother Witch and the relay races, Jean and Cherie will want to come in to prepare the crackers and juice. I know the rest of you will like to play for awhile by yourselves. Who will want balls? Stephen, will you take out the box of balls and bring them in when we are through? Who will want jumping ropes? Linda will be responsible for the jumping ropes. Who will want to swing? To slide? Who will play on the tricky bars? What do the rest of you plan to do?"

Individual storage facilities for 30 mats.

Two 50-foot lengths of plastic clothesline or heavy twist cord.
All weather outside play area.

Indian clubs and storage available at least on a school basis.

Storage for napkins, paper cups, crackers, juice, and pitcher.

Special lightweight portable box containing pigeon hole for indoor baseball, three 9-inch diameter rubber balls, one 12-inch diameter rubber ball, and one rubber socker ball. Storage board for one 15-foot jumping rope, 6 individual jumping ropes, each mounted separately on the board so that a glance can determine if any are lost.

"Remember to watch for me so you will know when it is time to come in. After we come back into the room a cracker and juice will taste good, won't it? Of course, before we go to our tables we will be sure to have washed our hands. It looks as if everyone is ready. Shall we go?"

On stormy days the group will need to play indoors. At times they may use the playroom. In this case, they will plan for the going, the coming back, and the equipment. Often they will move the furniture back and clear the room for playing Squirrels in Trees, I Spy, Centipede Relay, object passing relays, Sally Over the Water, Froggie in the Middle, and other games of this kind.

Swings on the playground.

Stainless steel slides.

One jungle-gym and one horizontal bars.

Mid-Morning Lunch

Mrs. Wells and the children have planned, experimented, and planned again until they have arrived at mid morning lunch procedure which suits them. Their aim has been to make this time a relaxing, orderly, and pleasantly sociable period.

Gymnasium of ample size to allow 30 minutes every day for every class group.

Joan and Cherie have arranged three long-tables with chairs along the wall by the windows. The children entering the room from the outside door or from the corridor go first to the coat closet then to the sink to wash, and to the tables. Joan and Cherie have arranged a napkin, paper cup, and cracker at each place. When all are seated at one table the girls pour the juice. When playtime is held in the room, the tables are set up in the corridor. The girls

Storage provided for lunch.

clear and wipe the tables when the children have taken the chairs to their reading stations.

Language Arts

Mrs. Wells speaks, "During reading time I will work first with the "Our New Friends" group. Will you people bring your chairs and make a half-circle by the chalkboard? Ten others bring their chairs and make an independent reading section over here. The ten who are left will have a quiet choosing time at their desks or at the library table until I call them up for their independent reading. When you need help with words you may ask your neighbor or come to me. Of course, all of us will use our voices very quietly so we won't disturb others."

The first group works together under the teacher's direction. Mrs. Wells spends a few minutes reading with one child at a time, helping him and noting his progress and needs. Another day she will group the children in relation to their needs and give specific instruction and drill on techniques that will help toward greater independence.

Lunch Period.

The children who go home for lunch put on their wraps and leave.

Mrs. Wells notes with interest the different ways which the children use to decide who shall sit by whom. "I'm glad to see Frank and Tom sit together"

Materials or provision for use of central lunch facilities by classroom groups of younger children.

One wall chalk board and one portable chalkboard, size 3' x 5' or 4' x 6' for each classroom.
Individual desks and chairs so chairs can be used either at desks or at reading circle.
Design classroom so that all four corners of the room can be used for groups such as this.

Round library table with open shelving for books conveniently near.
Provide accoustical surfacing in the class to minimize necessary noise from several sub-groups acting individually at the same time.

Lunch room or kitchen or both conveniently located with ventilating system so designed that food odors do not circulate through the rest of the school.

she thinks. "Frank is new to the school. Before today he has needed the security of sitting by his bigger brother.

After Mrs. Wells eats her lunch she relaxes for a few minutes in the Teachers' room. She likes to be back in her classroom well before one o'clock. This is a time like the early morning period when many opportunities arise to visit with the children individually and informally. She values this get-acquainted time.

Teachers' lounge for relaxation, for make-up including private lavatory and toilet facilities.

Skills and Drill Period

Mrs. Wells with the help of some youngsters, has the chairs and desks arranged for arithmetic groups when the one o'clock bell rings. Fifteen single desks are in a circle at the back of the room. A chair is by each desk. The other desks are spaced about the front of the room.

First the children meet briefly on the rug. Several times a week Mrs. Wells tries to bring to the direct attention of the entire group ways in which numbers function in their daily living.

Today she has asked for a report from John who cares for the aquarium this week. The problem came up during work period.

"Monday I added one quart of water to the aquarium. I wasn't here Tuesday so this morning I added two more quarts. Last week Kay and Tom said they put one gallon of water in the aquarium." This problem was John's.

Provisions for placement of aquarium in each room with aquaria for half the rooms. (It is unlikely that every teacher will decide to maintain an aquarium every year.

"Have you added a gallon of water this week?"

"I don't know."

"Let's find out, shall we?"

Some youngsters in the group knew the answer and had a hard time refraining from saying it. Mrs. Wells knew this and said, "If we all watch, each one can find the answer for himself. Is it a good way of learning--to find the answer for yourself?"

The children nod.

"What equipment will we need?"

"The gallon jar." John brings that.

"The quart measure." Susan brings that.

"Plenty of water." Fred and Linda each bring a good-sized pitcher of water.

Storage for water pitcher.

The equipment is set on a low table in full view of the children in front.

"How much water does this hold?" Mrs. Wells fills the quart measure. "Is it as much as a gallon." The water is poured into the glass gallon container.

"Now as we pour in another quart, will that fill the gallon jar?" John has put three quarts of water into the aquarium this week. Is that as much as a gallon?" She pours the third quart in.

John says, "No, it isn't a gallon, but it won't take much more. I guess another quart will fill it."

"We measured the water last week with the milk bottle," says Kay. "I think it holds more than the bottle John used."

"Milk bottles are bigger than that bottle you have," remarks Frank. "I think it holds more."

Storage cabinet for a wide variety of liquid and dry bulk and linear measuring devices.

"Bring the milk bottle from the measure cupboard, will you, Frank?" When the bottle is brought, Carol observes, "The milk bottle is taller but it isn't as big around as the fruit jar. I think they hold the same amount."

"We can find out for ourselves, can't we?" says Mrs. Wells.

The experiment is repeated, using the quart milk container.

Mrs. Wells points to the chart of the daily program. "Remember, I'll be working with Ronald's group in Numbers in Action today. While his group is getting in their places with their books and ten small objects each, I'll show Elizabeth's group how to do their worksheet." She explains the worksheet. It supplements the lesson of the day before when Elizabeth's group worked together in the circle of desks under her direct guidance.

Provisions for the storage of a wide variety of kinds of paper in such a way that the supply can be kept neat, yet conveniently available to boys and girls.

"You may work by yourself or with a partner. When you finish you may practice writing numbers on the blackboard or this paper with squares. Or you may play dominoes, the marble game or do any of the activities on this table." On the table have been placed a number of puzzles, duplicated sheets and games involving numbers.

Storage for a variety of indoor games.

Floor space for the table and the activity.

"Before you go to your desks let's roll the rug out of the way." Mrs. Wells works with the children in the circle of desks. Each child works with his book first. Later the children move their chairs inside the circle of desks and do number work with the flannel board.

When the lesson in numbers in finished, the desks are quickly arranged in compact rows so each child will have a good view of the chalkboard. A writing lesson follows at this time.

Music Activities

It's easy to see that the children love all the music activities because they are so eager to help prepare for them. The desks are pushed back against the wall. Two husky boys bring the dust mop from the teacher's closet and swiftly clean the cleared space in the center of the room. The chairs are first arranged in compact, concentric semi-circles for singing. The piano is rolled in from the hall. The music books with the songs for the day marked, are brought from the book cupboard and arranged on the piano. The record player is plugged in and the records which had been selected in the morning are set out. The rhythm instruments, some store-bought and some made by the children and teacher, are laid out in orderly and convenient arrangement on the low table in front of the group. The big loose-leaf book of pictures which illustrate many of the songs familiar to this group is set

One-half as many flanel boards per school as there are classrooms.

Storage available in the supply room for flannel boards.

Two counter brushes, 24-inch dust mop and two dust pans for each room.

Space for piano.

Piano mounted on special rigging with 4" rubber casters to permit ease of movement and prevent tipping. (One to every six or seven classrooms.)

Shelving available to accommodate sufficient storage of music books as well as pamphlets and individual pieces of sheet music.
Record player either available for each classroom or one mounted on wheeled carriage (one to every 3 or 4 rooms) (Storage room located in connection with the library so librarian can control the service.)
Storage in audio visual aid room.
At least two wall electrical outlets available in each classroom; one at the front of the room,

on the table, too.

Several familiar songs are sung while the teacher plays the accompaniment. The picture which illustrates each song is held up. On some songs the children use rhythm instruments as an accompaniment. Each child selects his instrument, plays it, then puts it back in its place. The songs which had been introduced the previous day are practiced a number of times to establish the melody and words. Some experimentation goes on with the rhythm instruments as children seek a satisfying accompaniment for this song.

Carol had composed a melody to a familiar poem. During the noon hour she and the teacher had succeeded in putting it down in notation. Some suggestions for improvements are made now. Those that are accepted are written down in a rough draft. By tomorrow Mrs. Wells will have made two nicely written copies of music and words. One, Carol's own copy, will go on the "Our Very Own" Bulletin Board until she chooses to take it home or place it in her own folder. The other copy will be placed permanently in the big book, "Our Own Songs."
The wide margins will be decorated either by Carol herself or under her direction.

Now the chairs are pushed back and the largest possible free space is left in the center of the circle. Children are sitting on the chairs which make the circle.

A short rhythmical selection is played on the record player. The children

one at the back.
Storage for rhythm instruments in classroom and audio-visual aid room.

Shelving available for paper and books from sizes 6" x 9" x 12" x 18", 18" x 24", and 24" x 36".

3 or 4 drawer file available in each room with at least two 9" by 12" folders available for each child.

Surface of classroom floor and classroom furniture should be adaptable enough that some rhythmic activities can be carried on in the classroom.

listen intently. There is a brief discussion, then into the dance they go. The group has worked out a plan for making best use of the dancing area. Those who care to dance take turns in the circle area. There is room for about one-third of the group in the space. The children accompany the dancing with bodily movements, or with musical instruments; some hum and some simply watch.

The selection is played through several times to give plenty of time to really do something. There are brief comments, then the next group dances. All have turns with several selections when the time-keeper reminds the group that "Time's up."

"Oh, let's start with rhythm tomorrow," several children suggest.

"And have 'Here We Go Round the Mountain'".

"Let's have 'Skip to My Lou,' too."

Clean Up

During clean-up time everyone is busy as each child, of course, is responsible for his own desk and belongings. Definite responsibilities for the community property and equipment are divided so that every child has some small duty to perform. The job-chart has drawings to make weekly assignments clear. This permanent chart has pockets where the children's names can be inserted to show who has a job for the week.

For the final planning time of the day and the literature period, the

A special collapsible and portable

children and Mrs. Wells like to be in a cozy, compact group so they usually sit on the rug or on chairs in the circle.

platform that can be rolled into place (one for each school to be stored in the audio-visual area.)

Today is different. A play is to be viewed. The scenery for the background is tacked on the cork board at the back of the room. During clean-up time the platform and screens have been put in place, so the chairs are placed in theatre rows facing the stage. Planning and literature will take place with everyone sitting on the rug close to the front of the room.

Portable 6 or 8 folding screens about 6' x 6' for each school.

Mrs. Wells tries to make the planning-for-tomorrow time as inclusive and definite as possible, yet keep it brief. She has printed beforehand, on large chart paper, an outline of a daily program with spaces on the right for filling in details.

Pre-ruled 24" x 36" paper.

The outline and plan look like this when it is completed:

Work Period Until Mr. Tom comes, about 9:30

Digging committee - W. R., L. S., T. O., S. T.

Big Blocks - C. S., E. W., M. N.

Easels - R. B., B. J., C. P., W. K.

Finger Paints - R. L., T. F., B. J.

Clean up

Discussion - Mr. Tom will talk.

Special Study - We will talk, write stories, make pictures about what Mr. Tom tells us.

Health Activities - A new kind of relay race.

Language Arts - Write thank-you letters to Mr. Tom.

Individual Reading

Noon

Drill Period - Elizabeth's group at front with number books.

Music - Rhythm first - "Round the Mountain" and "Skip to Lou."

Planning

Story Time - Poems - Margaret and Linda
Christopher Robin Records.

The questions about bicycle safety are completed and have been placed on a chart. Officer Tom will answer these.

"We'll be wise when we know the answers to all these questions," says Stephen. "Let's hang them up so he can read them over while we clean up in the morning," suggests Marilyn.

The people in the play leave to put on their costumes behind the screens; the others settle down for a story.

Mrs. Wells has previously read aloud a number of old folk tales. She believes these should be a part of every child's literary heritage. Also, they are so suitable for re-telling and dramatizing in a variety of ways with puppets, flannel board, picture show, and radio and others.

Portable puppet theatre for each school
Intercommunication system so that radio programs can be presented.

The "Husband Who Kept House" is the story Mrs. Wells tells today. The children's comments reveal how delighted the children are, and how they are analyzing stories for their dramatic possibilities. Karen's mother and little brother come in during the story time. They feel at home, for they have visited a number of times before for various reasons. Karen quietly slips out of the group and acts as hostess. She is at ease from having had experiences of her own and from observing other children greet their parents and make them comfortable.

At least two adult chairs for every classroom.

Now the play is ready. With their best "theatre manner" the children go to their chairs and are transported to the land of the "Princess Who Could Not Laugh." Between scenes, carefully selected records are played to maintain the fairy-tale feeling.

When the play is ended Karen's mother adds her comment of sincere appreciation to those expressed by the children and teacher.

Each chair and desk is put in place and good-byes are said as the children leave for home. Mrs. Wells gives a helping hand to the players and soon the screens, costumes and platform are in place. The scenery is carefully rolled up and placed on a high shelf. "It will be good for another town scene," says Anne, the chief designer and painter. "If we take good care of it maybe we can use it for five more plays."

Storage of costume box in the audio-visual aids.

Extra high shelf for storage in coat closet.

Karen has been enthusiastically showing her mother things of interest about the room. Now all the other children are gone and she takes her brother out to play on the swings and slides while the parent-teacher conference goes on.

Counsel-type teachers' desks which provide knee room under both sides and which invite discussion rather than mere report.

"Shall we sit here?" Mrs. Wells draws another chair up to her desk. She brings two folders from the file, one in which Karen keeps samples of her own work, the other containing the teacher's records of Karen.

"I really enjoyed the play," comments Karen's mother. "It was so natural and child-like. They seemed to entirely forget the audience and to live their parts."

"We will have opportunities during the year to stage plays on the big stage in the auditorium, but there are advantages in having many plays in the classroom. There is more self-expression when the audience is familiar and not too large. A play is a performance when it is done on the big stage. Also, when plays are put on in the classroom, each child can be in many plays and have all the opportunities for the kind of planning and group interaction and fun that putting on a play involves," Mrs. Wells explains.

"We couldn'g have done it in the room where I attended second grade," ways Karen's mother. "The desks were screwed to the floor and I felt screwed into my desk. There were blackboards on all the wall spaces not taken up by windows and doors. We had to form a line and march in and out through the long hall and up and down stairs."

"Yes," says Mrs. Wells, "a modern school program requires plenty of space. It needs *flexibility of arrangement* and a *wide selection of tools and equipment*." Storage

At the conclusion of the parent-teacher conference, Mrs. Wells spends some time in the supply and work room. She replenishes supplies, cuts and rules paper, and types up the conclusions of the conferences with Karen's mother.